D 7.24: 985/1

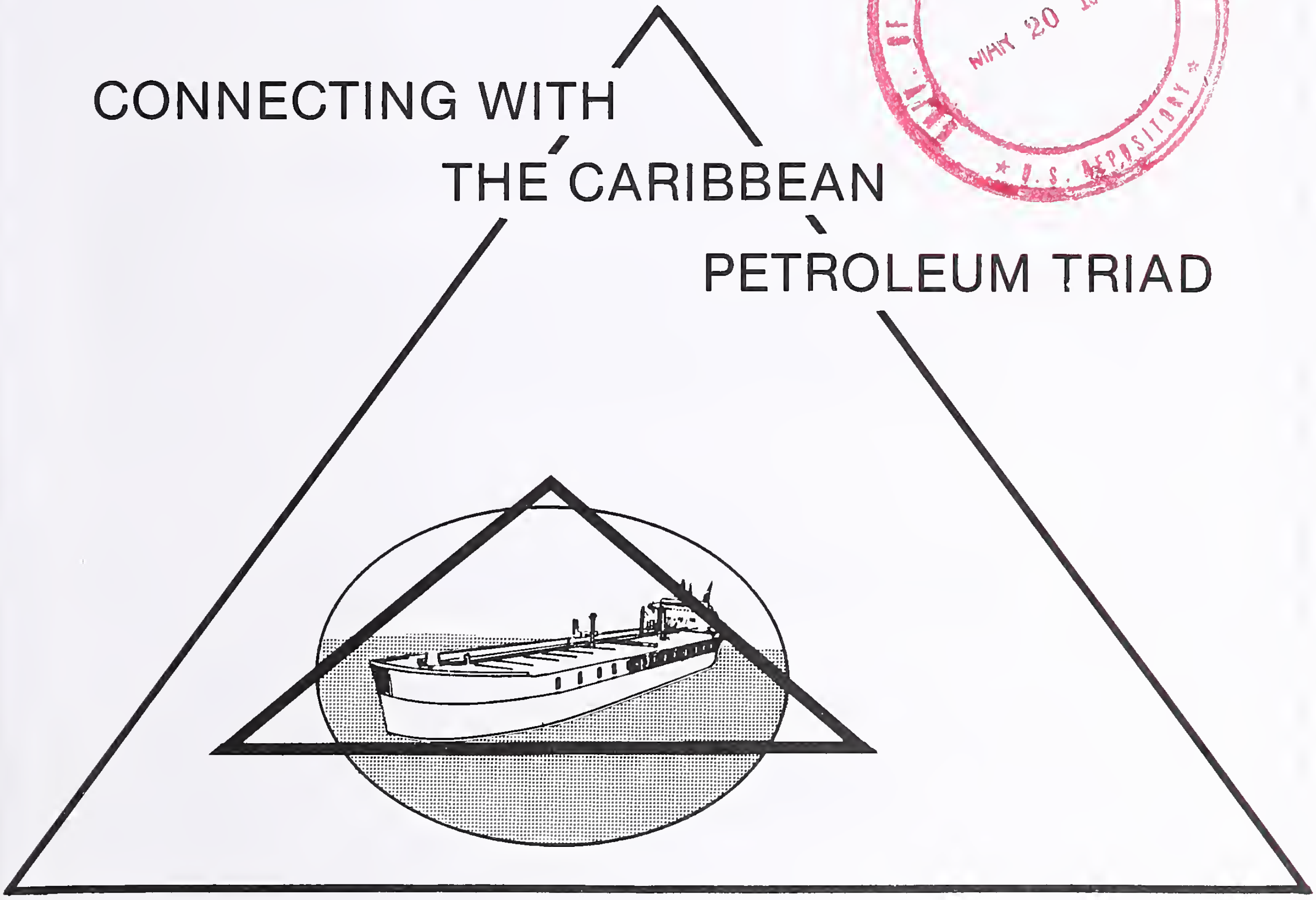
WINTER 1985

FUEL LINE

DEFENSE FUEL SUPPLY CENTER ▮ CAMERON STATION ▮ ALEXANDRIA, VIRGINIA

UNIV. OF FLA. LIB. ★ DOCUMENTS DEPT. ★ U.S. DEPOSITORY
MAY 20 1985

CONNECTING WITH THE CARIBBEAN PETROLEUM TRIAD



INSIDE

OIL SPILLS STUDIED IN PERSIAN GULF

REPORTING PROBLEMS WITH TURBINE FUEL ADDITIVES

DFSC

Fuel Line

A DEFENSE FUEL SUPPLY CENTER TECHNICAL PUBLICATION

Oil Spills Studied in Persian Gulf

Despite the war, a scientific team studied circulation in the Gulf to predict the path of future spills.

1

No Pipe Dream: Successful Class III Support

Thanks to careful planning and the Petroleum Distribution System, Korea, there was no shortage of fuel or heat during Team Spirit '84.

3

Connecting With the Caribbean Petroleum Triad

The region has always been a crucial offshore refining base; two other enterprises now make it an area to watch.

5

Reporting Unsatisfactory Turbine Fuel Additives

The DFSC Technical Directorate details actions to take when fuel additives cause problems.

10

The Petroleum Industry Is 125 Years Old

It all began with "Colonel" Drake in Titusville, PA.

11

Enhanced Oil Recovery: Partners in Progress

The Energy Department is looking for innovative research to expand enhanced oil recovery.

12

What Is Enhanced Oil Recovery?

Conventional drilling recovers about one-third of the oil in a reservoir; EOR is an attempt to obtain the remainder.

13

EIA Says New Finds Needed to Maintain U.S. Oil Production

The Federal Offshore, the Alaska North Slope, and other relatively unexplored areas offer the best potential for the major discoveries needed.

17

North Sea Output Nears Its Peak

European oil production is expected to decline through the next century and a rise in oil imports is forecast.

18

EIA Projects Record 1984 Coal Production and Consumption

EIA estimates 1984 production at 892 million tons, up 14 percent from 1983 levels; consumption was expected to rise 8 percent from 1983.

19

Use Compressed Gas in Cars, Firms Urge

It's a clean, efficient, and novel idea.

20

DFSC Coal Program Is a Small but Lively Business

Coal constitutes a tiny portion of the Center's procurement, but many customers throughout the world depend on the fossil fuel.

21

Fuel Line Gleanings

New contracts for the Strategic Petroleum Reserve, an innovative use for waste oils, another fuel tank for the Army, and other military petroleum news.

27

Personnel Notes

It's award time for several DFSC employees, the quality surveillance training program begins, and the Center is making some organizational changes.

31

OIL SPILLS STUDIED IN ARABIAN GULF

The intense regional war in the Persian Gulf helped and hindered the work of a four-man research team sent there to study the Gulf's water circulation and its effects on oil spills.

The members of the team were Bob Pickett and Bob Arnone of the Naval Ocean Research and Development Activity (NORDA), R.M. Partridge of the National Oceanic and Atmospheric Administration (NOAA) Data Buoy Center and J. A. Galt of NOAA's National Ocean Service.

Oil spills and leaks have long been a problem in the Gulf because about half the world's oil supply is pumped and shipped through the area. Between 1965 and 1976 for example, Kuwait recorded more than 100 spills. Recently the Iran and Iraq war has aggravated the problem. In March 1983 Iraq destroyed an Iranian oil rig in the north end of the Gulf. A few weeks later more rigs in the area were destroyed. Amounts of oil in the Gulf from these attacks was initially estimated at 2,000 barrels a day, but may have reached 18,000 barrels a day as damaged rigs melted and the oil-consuming fires went out.

Most of this oil is trapped in the Gulf, which covers 240,000 kilometers² and extends 800 kilometers southeast from the Shatt-al-Arab River inflow to the Musandam Peninsula. At the southeast end, the Gulf ends in the Strait of Hormuz which opens into the Gulf of Oman and then into the Arabian Sea. The width varies from 80 to 300 kilometers. The mean depth is 40 meters, but it increases more rapidly off the mountainous northeast shore than off the flat southwest shore.

The researchers used drifting buoys which were purchased by Saudi Arabia in order to monitor oil in its waters: seven of these air-deployable buoys were launched in the Gulf last May and June. After a month of data collection, researchers compared the buoys' paths with historical information and a hydrodynamic model. Scientists discovered the water's mean circulation to be counterclockwise, with speeds of 20 centimeters per second; they believe that paths of oil spills can indeed be predicted.

Historical data, model results, and the drifter tracks all agree in the region where the drifters were deployed; the mean current is to the south. In the northeast end of the Gulf, however, there is some disagreement. The southeastbound nearshore current forecast by the model was not observed; hence, it is not shown in the historical data. But logically, currents in the shallow region should respond to the northwest wind and move toward the southeast down the coast.

> *"The NORDA/NOAA team feels the discrepancies between the model and historic circulations in the northeastern Gulf need to be resolved. This is the area where most of the oil is spilled, but the war rules out direct observations."*

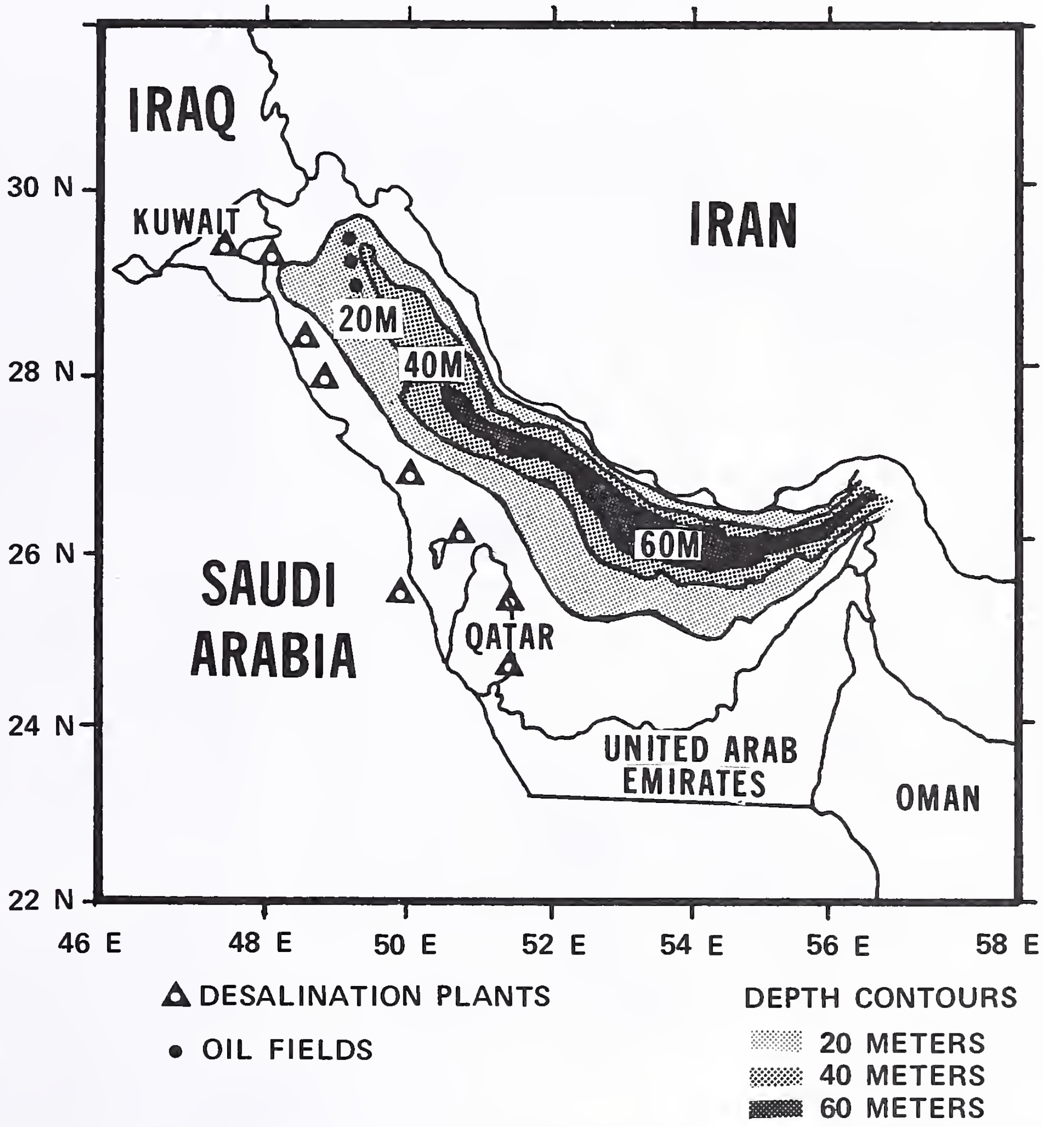
To resolve the discrepancies in northern Gulf circulation, the team reviewed satellite pictures from March 1983. The NOAA-7 visible and infrared bands show dark, warm streaks heading southeast from the damaged rigs. If these were oil streaks, then the pictures would confirm the model circulation. The burning rigs, however, also created lots of smoke which would blow southeast with the prevailing winds. Owing to the problem of separating oil and smoke, these pictures could not definitely confirm the model circulation.

The tendency toward counterclockwise circulation in the Gulf, evident in both the historical and model current patterns, partially results from the interaction of the northwest wind and asymmetric bathymetry. The shallow regions on the southwestern side of the Gulf are more susceptible to these winds; currents there tend to spin up faster and stronger than those off the opposite coast.

Water following the observed current pattern at the mean speed of 20 centimeters/second would require several months to travel the length of the Gulf. During such a trip, tidal and inertial currents would produce oscillations along the way (with displacements of about 10 to 20 kilometers). For oil spills these currents would combine with 2 to 4 percent of the wind. Spills in the northern reaches of the Gulf would be carried west and then south by the currents. This combination will result in oil from the war-damaged rigs bleaching well away from the source and far down in the Arabian Gulf.

The NORDA/NOAA team feels the discrepancies between the model and historical circulations in the northeastern Gulf need to be resolved. This is the area where most

DESALINATION PLANTS, BATHYMETRY AND WAR-DAMAGED WELLS, AMONG THE COUNTRIES IN THE PERSIAN GULF REGION.



of the oil is spilled, but the war rules out direct observations. It would take a mighty sophisticated analysis of the satellite pictures to separate smoke from oil and resolve the discrepancies in the northern circulation of the Gulf.

Oil spills in the area end up on the beaches of one of six countries that border the Gulf. Iran occupies the entire northeastern shore; Iraq has a 60 kilometer frontage at the northern end; the southwest (Arabian) side is divided among Kuwait, Saudi Arabia, Qatar, and the United Arab Emirates. Spills present special problems to these countries. In addition to the usual toxic effects on marine life, including extensive shrimp and other fishing industries, and shore damage, oil threatens several desalination plants and, therefore, the fresh water supply of the area. FL

NO PIPE DREAM

SUCCESSFUL CLASS III SUPPORT

by First Lieutenant Donald Dodd, USA

It is 4 a.m. on a cold, dark morning in South Korea. Outside it is 4 degrees Centigrade, but to 25th Infantry Division soldiers who have pulled off their olive drab cocoons and bared their frostbitten noses inside the medium general purpose tent, it feels much colder. They jump out from under their blankets, grab their cold-weather gear, and gather around the pot-bellied stove to dress by a warm fire. But there is no warmth emanating from the stove!

Private Raines, the 76-Whiskey responsible for all the company's fuel support, is hauled out of bed and snatched out of his dream of a Hawaiian beach and a cold beer. Once he enters the frigid world of his tent from the torrid world of his dreams, Raines explains there is no fire and no heat because there is no fuel; there won't be any for another 2 days. The Division did not project sufficient fuel requirements, so fuel is critically low. Fuel is available only for essential operations: hospitals, communications, and mess halls.

Fortunately this scenario occurred only in my imagination. Thanks to successful class III supply support from the Petroleum Distribution System, Korea (PDSK), there was no shortage of fuel or heat during Team Spirit '84, a joint U.S. military-Republic of Korea training exercise. Good planning by the 25th, supported by an effective pipeline system in Korea, ensured that fuel was always available.

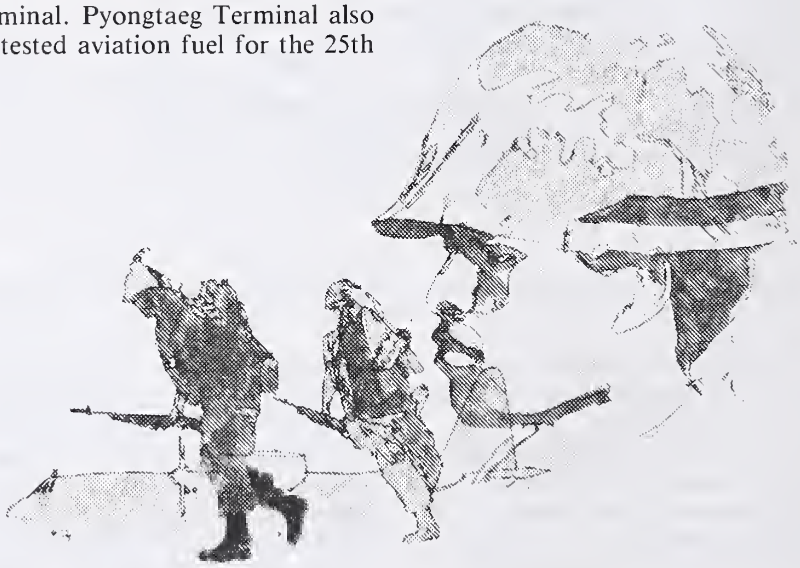
The 25th Division began making preparations for the cold-weather exercise 4 months before deployment. Sufficient grade 1 diesel fuel and methanol-treated gasoline were produced for the equipment that would be used in the exercise. Units were advised to convert their vehicles and generators to cold-weather fuel and change filters before the conversion.

As the Division's Materiel Management Center's class III officer, I submitted fuel requests for each base camp and all projected tactical operations to PDSK 3 months before the exercise.

When the first units arrived in Korea, the Division Support Command had to establish support operations at three separate base camps—Camps Long, Page, and Humphreys. Railcars arrived at Camps Page and Long 2 days before the influx of equipment and personnel. Retail fuel was issued by the director of industrial operations at Camp Humphreys; bulk fuel was obtained from the PDSK Pyongtaeg Terminal. Pyongtaeg Terminal also lab-tested aviation fuel for the 25th Division. The 348th Supply and Service Company of the 194th Maintenance Battalion provided two hot refueling points for Division aircraft before the exercise.

Careful plans were made for the transition from base camp fuel support missions to those of actual field operations before the exercise began. I had coordinated the placement of railcars at Wonju railhead, near Camp Long, 3 days before the exercise began.

During initial operations two fuel points were established; a large fuel point at the Division Support Area (DSA) with 3 days of fuel on hand, and another refueling point in the Brigade Support Area (BSA) with 2 days of fuel on hand. Ground fuels were delivered from the Wonju railhead to the DSA. Upon request, fuel was transported forward from the DSA to the BSA.



ARMY LOGISTICIAN, *January-February 1985*

To support ground and aviation fuel missions, the Republic of Korea Army augmented the Division's assets with additional 5,000-gallon fuel tankers. More than 7,000 gallons of fuel were airdropped into the DSA in 500-gallon collapsible drums. These drums were later delivered by helicopter to the forward support battalion refueling point. The Division consumed more than 90,000 gallons of each ground fuel during the 7 days of Team Spirit '84 operations.

The aviation units within the Division established four primary hot refueling points. More than 100,000 gallons of JP-4 (jet petroleum) were hauled from the Wonju railhead to the Division's hot refueling points.

During the field maneuvers, the 2d Brigade moved forward quickly in an offensive operation. As the Brigade advanced, a portion of the BSA refueling assets went forward. In a similar manner, the aviation units separated a small contingent of their fuel assets and established a jump forward area refueling point to support air missions.

Not only did Team Spirit '84 offer exceptional training for all the Division's fuel handlers, it proved that the Petroleum Distribution System, Korea, works! FL

First Lieutenant Donald Dodd is support operations officer, S3 Office, 25th Infantry Division Support Command, Schofield Barracks, HI. He is a graduate of Old Dominion University, Norfolk, VA.

"During the field maneuvers, the 2d Brigade moved forward quickly in an offensive operation. As the Brigade advanced, a portion of the BSA refueling assets went forward. In a similar manner, the aviation units separated a small contingent of their fuel assets and established a jump forward area refueling point to support air missions."

CONNECTING WITH THE CARIBBEAN PETROLEUM TRIAD

by Major Bob Jarvis, USA

The Caribbean Basin has customarily been a crucial offshore refining base for the petroleum industry and, in turn, the Department of Defense (DOD). Now the region is involved in two other enterprises which make the Caribbean Basin an influential petroleum triad. First, the basin provides extensive supplies of crude oil. Second, island nations in the area funnel crude oil from other regions through shore tanks into smaller tanks that can fit into U.S. ports (transshipment terminals).

The Caribbean Basin, for purposes of this article, is located south of Florida, west of Trinidad, north of Venezuela, and east of Mexico. Although the military fuels logistician has long been familiar with the Caribbean because of its contribution to petroleum refining, the rest of the world has only recently become aware of the area in terms of its sensitive political climate.

This article discusses the three legs of the Caribbean petroleum triad and makes suggestions for keeping our Nation keenly aware of the region's complexities and possibilities.

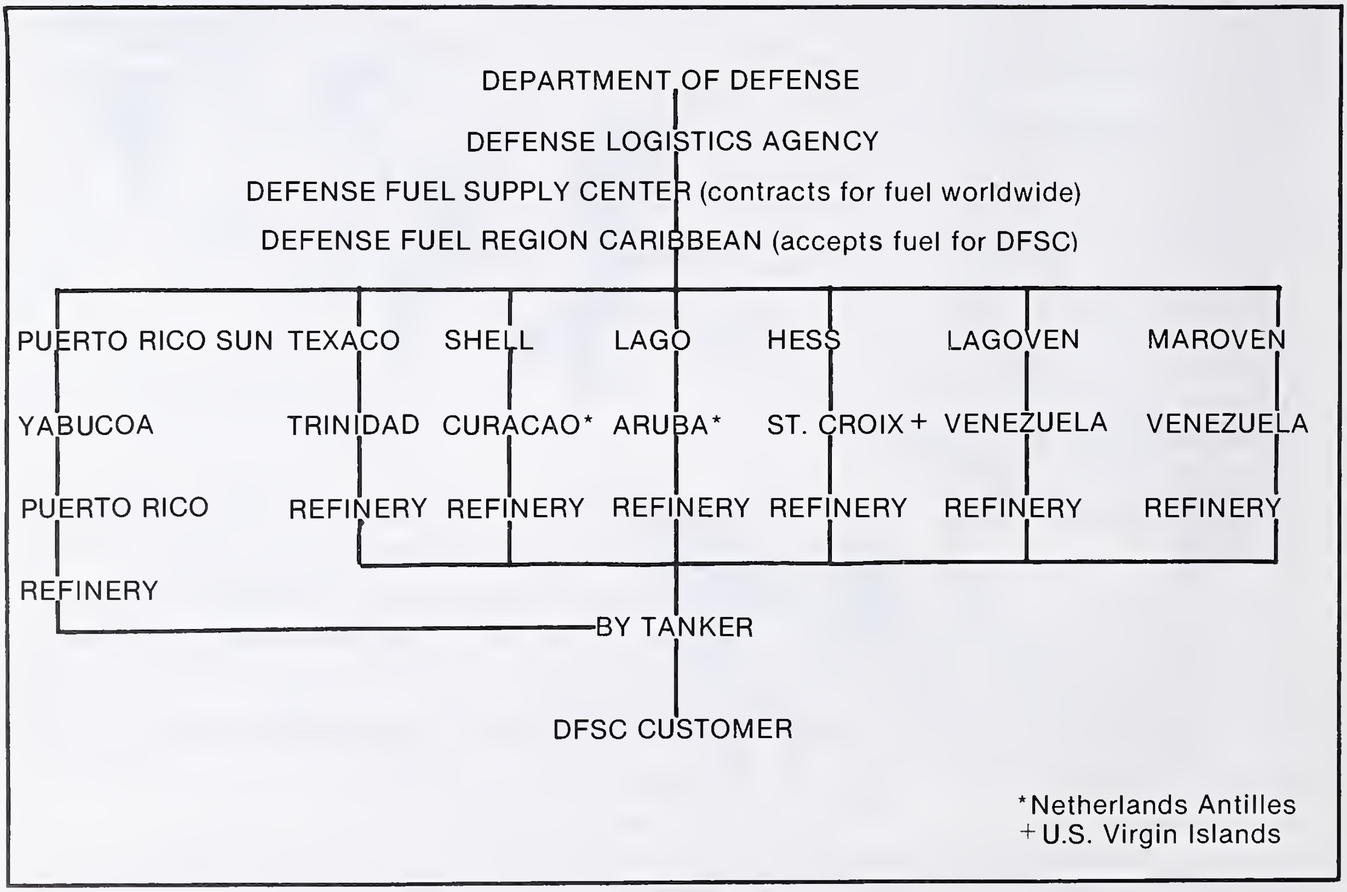
The First Leg of the Triad: Refining

This is the oldest segment of the triad. The Caribbean Basin has a long history of supplying refined products for the military. Acquisition of these fuels, including Navy special fuel oil and jet fuel, was managed by the Navy until 1973. During that year, DFSC became the integrated materiel manager for bulk petroleum and began to handle the acquisition of military fuels.

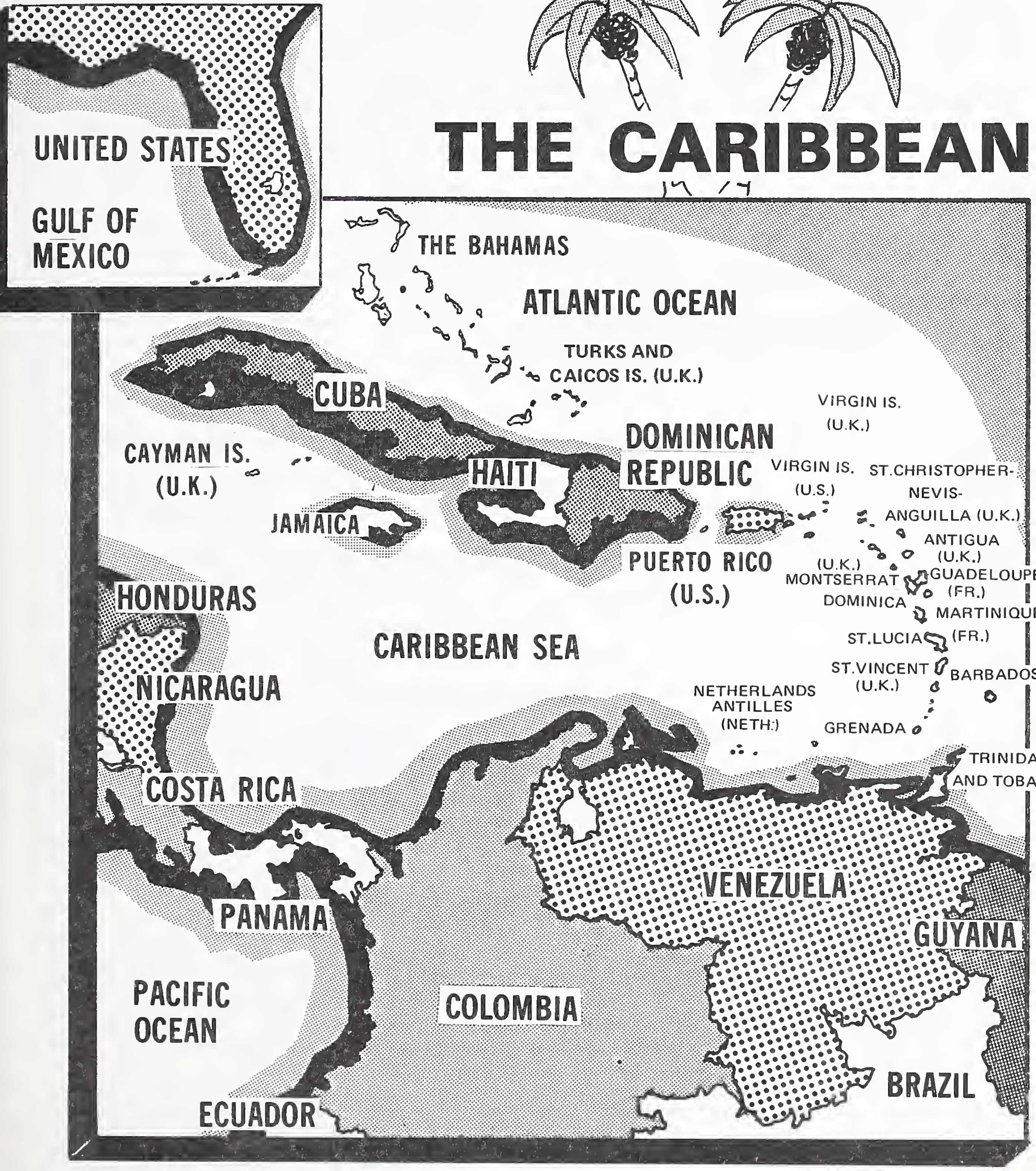
The current value of DOD petroleum contracts in the Caribbean is over a billion dollars a year. This estimate is based on September 1984 figures for 180 tanker liftings per year.

There are as many as seven refineries in the basin which historically have supplied refined products to DFSC customers. The accompanying chart illustrates a simple supply flow for the region.

Products have usually been



THE CARIBBEAN



shipped from four or five refineries with active DFSC contracts (the seven companies illustrated by the chart, and two additional refineries in Puerto Rico). These refiners are now competing with major crude oil exporters (like Mexico and Venezuela) who want to increase their own refined product market by cutting the Caribbean out of the supply chain. These crude oil suppliers could then process more of their crude oil and keep refining profits at home (i.e., cut out the middle man).

Predicting trends in any petroleum operation is risky, but looking back, we know the Caribbean did supply military fuels even during World War II. Current year-to-year contracts are very fluid, but I think we can reasonably assume adequate supplies will continue. This projection is based on current low production (relative to capacity) rates of most Caribbean refineries. Furthermore, DOD contracts account for only a fraction of the refineries' output.

The Second Leg: Transshipment

In 1945 the average oil tanker weighed 16,500 deadweight tons and was approximately 500 feet long. By 1976 the tanker's weight had increased over 30 times; its length, 2½ times. The reason is simple: as tanker sizes and capacities increase, fuel transportation costs decrease.

The use of very large and ultra large tankers poses problems, however, if there are no deepwater ports at which they may dock. The Louisiana offshore oil platform is a rarity; the United States has limited deepwater facilities.

In the process known as lightering, supertankers' cargoes may be pumped directly into smaller ships while the tanker is offshore Transshipment is proving more advantageous, however, and is environmentally and economically sound.

A transshipment terminal is simply a deepwater port with oil storage tanks. Supertankers can unload up to 3 million barrels of fuel into these tanks. Smaller tankers then shuttle the cargo to U.S. ports.

There are three large Caribbean transshipment terminals: Burmah Terminal at Grand Bahama; Curaçao Oil Terminal (COT) in Curaçao, Netherlands Antilles; and Bonaire Oil Petroleum Export Corporation (BOPEC) at Bonaire, Netherlands Antilles. Each facility can handle more than 450,000 barrels a day.

The DOD was not directly involved in transshipment until the advent of the Strategic Petroleum Reserve (SPR). [Since the late 1970s the Department of Energy has been buying foreign crude oil for storage in salt domes in Louisiana and Texas. DFSC purchases crude oil for the SPR.] Now all three transshipment terminals have been used to transfer SPR cargoes from the Middle East and North Africa to the U.S. Gulf Coast.

> *"A transshipment terminal is simply a deepwater port with oil storage tanks. Supertankers can unload up to 3 million barrels of fuel into these tanks. Smaller tankers then shuttle the cargo to U.S. ports."*

During the recent crude oil glut, transshipment has decreased because of a corresponding decrease in smaller tanker (those which can unload in shallower water) rates. Because crude oil is relatively inexpensive, tanker rates are also depressed and it's possible to ship fuel in two smaller (normally less economical) tankers, and forego transshipment.

Despite the transshipment lull, new terminals are already on the Caribbean drawing board. When oil prices climb again, these terminals will be widely used once more to keep transportation costs down.

The Third Leg: Crude Oil Production

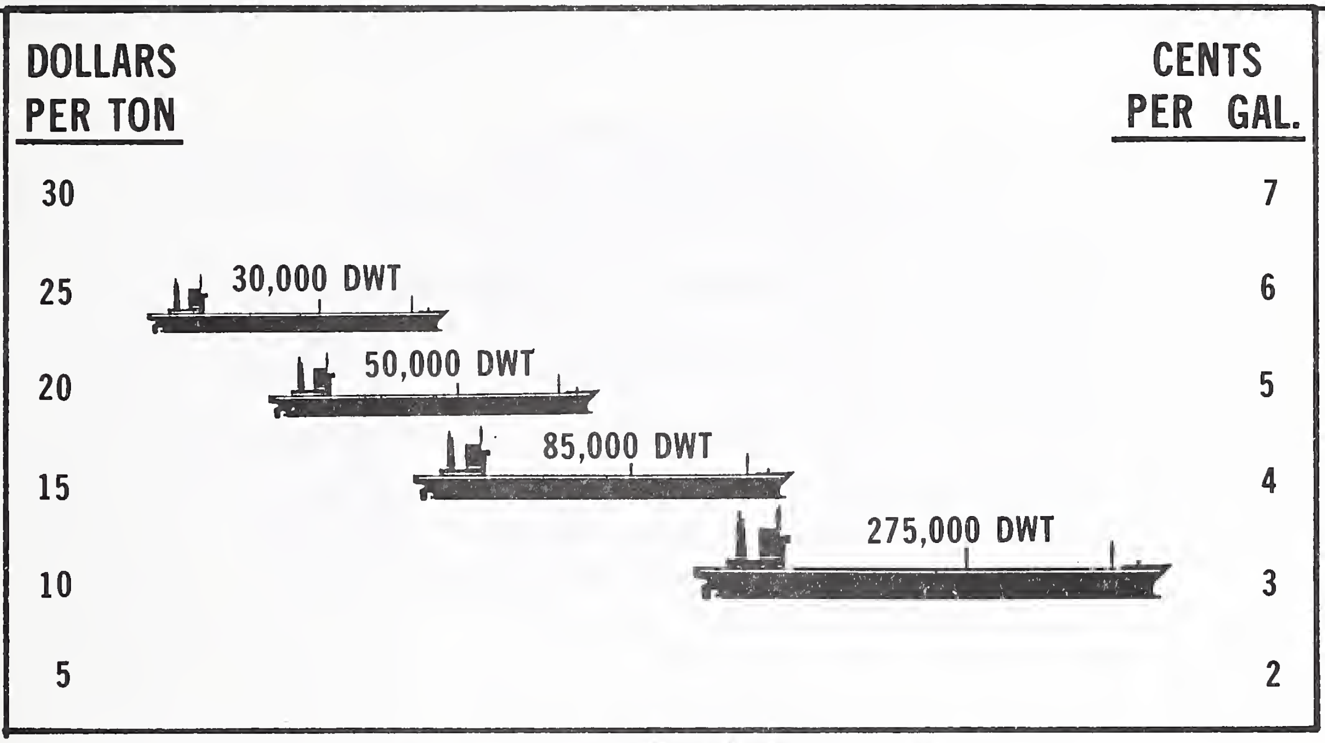
Venezuela and Mexico produce most of the Caribbean's crude oil. (Trinidad is the third largest producer in the area.) It is generally a heavy crude oil and some varieties contain a lot of sulphur, making them less desirable on the world market. As the quality of worldwide petroleum crude oil starts to decline, however, Caribbean varieties will be more appealing to U.S. refiners.

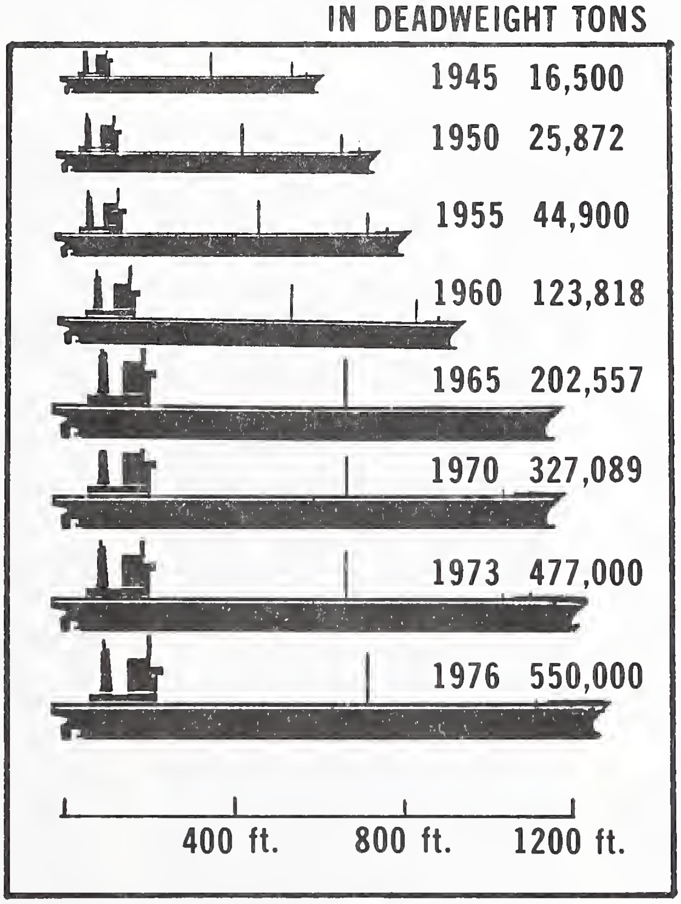
Mexico has fairly steadily supplied crude product for the SPR since 1978. The country currently wishes to keep its U.S. crude export to less than 50 percent of its production, but the oil glut and political factors could affect this restriction.

DFSC established a quality assurance office in the Mexican Gulf Coast city of Coatzacoalcos to handle crude oil lifts for the SPR. Contracts are currently in effect to lift about 110 million barrels of Mexican crude oil, valued at nearly $3.5 billion.

Depending upon the vagaries of worldwide politics and the petroleum economy, Caribbean crude oil could provide the United

TRANSPORTATION COSTS BY TANKER SIZE 1975





COMPARATIVE TANKER SIZES

REFINING
CRUDE PRODUCTION
TRANSSHIPMENT TERMINALS

> *"Depending upon the vagaries of worldwide politics and the petroleum economy, Caribbean crude oil could provide the United States with the energy security it needs. The region is nearby, and would provide secure lines of communication during possible disruption of sea lanes to the Middle East or North Africa."*

States with the energy security it needs. The region is nearby and would provide secure lines of communication during possible disruption of sea lanes to the Middle East or North Africa.

Recommendations

The Federal Acquisition Regulation (FAR) indicates that contract awards should be based on best price and "other factors considered." The benefits of the Caribbean petroleum triad should be one such factor; the United States should maintain substantial interest in the area.

The petroleum community might consider the following:

- Refinery contracts should be kept diversified. The DOD should encourage and use contracts from dormant (Puerto Rico, for example), and new contractors (Mexico, Venezuela, etc.).
- Crude oil procurement in the Caribbean is not only an economic enterprise, but one guided by political factors. Key State Department, DFSC, and Defense Fuel Region Caribbean personnel must be sensitive to the current political climate as well as the details of current contracts.
- Use of transshipment terminals is fairly recent. Government contracting and quality assurance personnel need to know the benefits and limitations of transshipment operations, especially contrasted with the quick turnaround operations of a BOPEC or COT.

Final Thoughts

DOD weapons platforms like the Bradley Fighting Vehicle, the Abrams Tank, the Tomcat Fighter and the non-nuclear Navy have one thing in common: they need the Caribbean petroleum triad to sustain the deep battle. FL

Major Bob Jarvis, USA, is deputy chief, Bulk Fuels Division, Directorate of Contracting and Production, DFSC. He was formerly assigned to the Defense Fuel Region Caribbean when it was headquartered in Puerto Rico. He served as a petroleum logistics officer there from 1978 to 1981.

In his 10 years of military petroleum experience, Jarvis has served as commander of the 276th Petroleum Operating Company and as a primary staff officer of the 240th Quartermaster Battalion (Petroleum Operating).

He spent a year with Sun Oil Company as part of the Army's training with industry program in 1977-78. He attended the U.S. Army Command and General Staff College from 1981 to 1982.

Jarvis has a bachelor's degree in management from Central Michigan University.

REPORTING UNSATISFACTORY TURBINE FUEL ADDITIVES

by Michael Shannon

DFSC and the petroleum industry have been experiencing an increasing number of fuel quality problems which can be traced to the various turbine additives currently in use.

These troubles run the gamut from lubricity problems to particulate contamination, from slow filtration to microbiological growth. When additives are suspected of causing problems with fuel quality, cognizant inspectors must check them against product specifications. If additives do not meet the standards, they must be removed from the supply system.

Packaged turbine fuel additives, specifically static dissipator additive (SDA), fuel system icing inhibitor (FSII), and corrosion inhibitor (CI), are 6850 stock class items and are procured and managed by the Defense General Supply Center (DGSC). Whenever a field activity determines that any SDA, FSII, or CI bought under a Defense Logistics Agency contract is unsuitable for use, employees should complete a standard form 364 (SF 364) "Report of Discrepancy," and submit it to the DGSC as soon as possible. The address is: Defense General Supply Center, ATTN: DGSC-SQB, Richmond, VA 23297-5000. After the Center receives the SF 364, it will process it and issue disposition instructions. Funds are credited to the submitting activity's account; the additive itself is not automatically replenished. Use regular ordering channels to replace unuseable additives.

Ensure that the processing of the SF 364 is not unduly delayed by filling it out as completely as possible. Include the contract number and batch/lot number.

Sampling and testing requirements for SDA and CI will be incorporated in Table IV-L of the upcoming revision to Military Handbook 200 (MIL-HDBK-200). FSII requirements for MIL-I-27686 are currently in Table IV-L. These requirements are to be applied to MIL-I-85470 as well. Deterioration limits for the additives will be developed and incorporated in new tables I-J, I-K, and I-L of the handbook. FL

Michael Shannon has been a quality assurance specialist in the Directorate of Technical Operations for the past 4 years.

EIA REPORTS RISE IN OIL AND GAS DRILLING COSTS

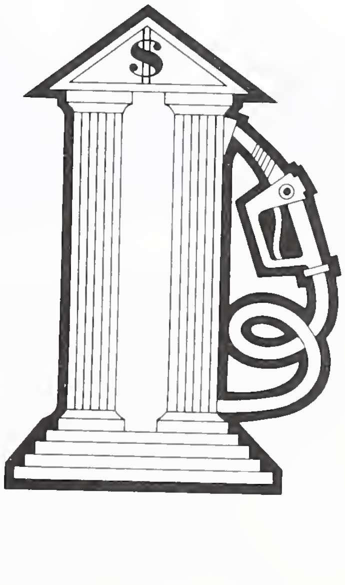
Oil and gas well drilling costs have risen in 1984, following a broad decline in 1983, according to a recently released study by the Energy Information Administration (EIA). Increases in composite well drilling costs in 1984 range from 3.5 percent for deep wells to over 17 percent for very shallow wells.

The EIA report, *Indexes and Estimates of Domestic Well Drilling Costs, 1983 and 1984,* is the third annual edition presenting estimated drilling costs by well depth and by geographic region of the United States. Drilling costs for 1970-82 reported to the Joint Association Survey are the basis for estimating 1983-1984 costs, with the use of 11 costs variables.

In the report EIA projects 1-year changes in drilling costs for 1982-1983, and also for 1983-1984, and tabulates the costs for each type of well drilled (oil well, gas well, or dry hole). EIA indexes these drilling costs (1976 = 100) for 1982-84.

The information in EIA's annual drilling cost report is used for economic modeling, financing, and planning purposes by the petroleum industry, government, financial institutions, and the academic community.

Copies of *Indexes and Estimates of Domestic Well Drilling Costs, 1983 and 1984,* are available from the U.S. Government Printing Office (GPO) for $4.50 per copy, GPO Order No. 061-003-00408-3, or through the National Energy Information Center, Room 1F-048, Forrestal Building, Washington, D.C. 20585, commercial telephone: (202) 252-8800. FL



THE PETROLEUM INDUSTRY IS 125 YEARS OLD

Petroleum Gazette, *Winter 1984*

On 28 August 1984 the modern oil industry had its 125th birthday, an event which passed virtually unnoticed, except in Pennsylvania.

It was on that day in 1859 that "Colonel" Edwin Laurentine Drake, 40, a former conductor on the New Haven railway in Connecticut, struck oil with the first commercial oil well in the United States.

The self-styled colonel, who'd never been in the army, held a small number of shares in the Pennsylvania Rock Oil Company, a modest concern which had been promoted by lawyer George Bissell, who owned land in a district of the state where there had been many seepages of crude oil found on the surface.

The company gathered this oil and sold it for "medicinal" purposes in the same way that North American Indian tribes in the vicinity had collected it for centuries themselves, also for its supposed curative powers.

Drake, a man of many parts, visited Titusville, the village in the western part of the state where the company was in business, to study techniques used in drilling salt wells. The technology was little different from the rigs used by the Chinese for centuries to drill for oil themselves.

It used an arrangement by which a drill bit was activated by a series of ropes to chip, chip, chip away a hole, deeper and deeper. In effect, the "drill" chiselled out a narrow well.

Drake adapted the salt drill to dig a well in a search for the source of the oil seepages. He was looking for what gold miners would refer to as "the mother lode."

Starting in 1858, with a rig protected from the weather by a wooden enclosure, Drake persevered until the hole slowly reached a depth of 21 meters all those months later—and he struck oil at that shallow depth.

The locals had sneered at "Drake's Folly," as they dubbed his planked-in structure. Drake had the laugh on them. By the time word circulated that he had actually found oil in the hole, Drake had already installed a small pump down-hole and was bringing crude to the surface at the rate of 30 barrels a day.

In a situation where oil was in growing demand as a source of kerosene for lamps, Drake was in a position to dictate terms. The Bissell-Drake venture was quickly fending off would-be purchasers who rapidly bid up the price of the crude to $20 a barrel.

Titusville became the site of the world's first oil rush. Some farmers made fortunes overnight without the bother of drilling for oil, as people poured in from all over, buying whatever land they could in the vicinity.

Land changed hands several times in a week as the oil rush gained momentum.

Not only Titusville was affected. Other communities in the vicinity likewise became boomtowns.

It would be nice to report that Edwin Drake became a millionaire and lived happily ever after. Not so. He did become the local judge. But he was not the sharp businessman he believed himself to be.

His first mistake was in not patenting his version of the oil drilling rig. His other big error was to sink his money into ill-advised oil speculations as a broker, where sharper minds than his prevailed. He lost everything.

After 10 years of poverty, his case was taken up by the State legislature, which took pity on him and voted him a small pension which he lived on until his death on 8 November 1880, in Bethlehem, PA.

The pension was small recognition of the wider implications of what "Drake's Folly" had wrought. It showed the world the way to the most versatile form of energy in liquid form, and revolutionized transport and industry. Internationally, whole economies were transformed—and remain so. FL

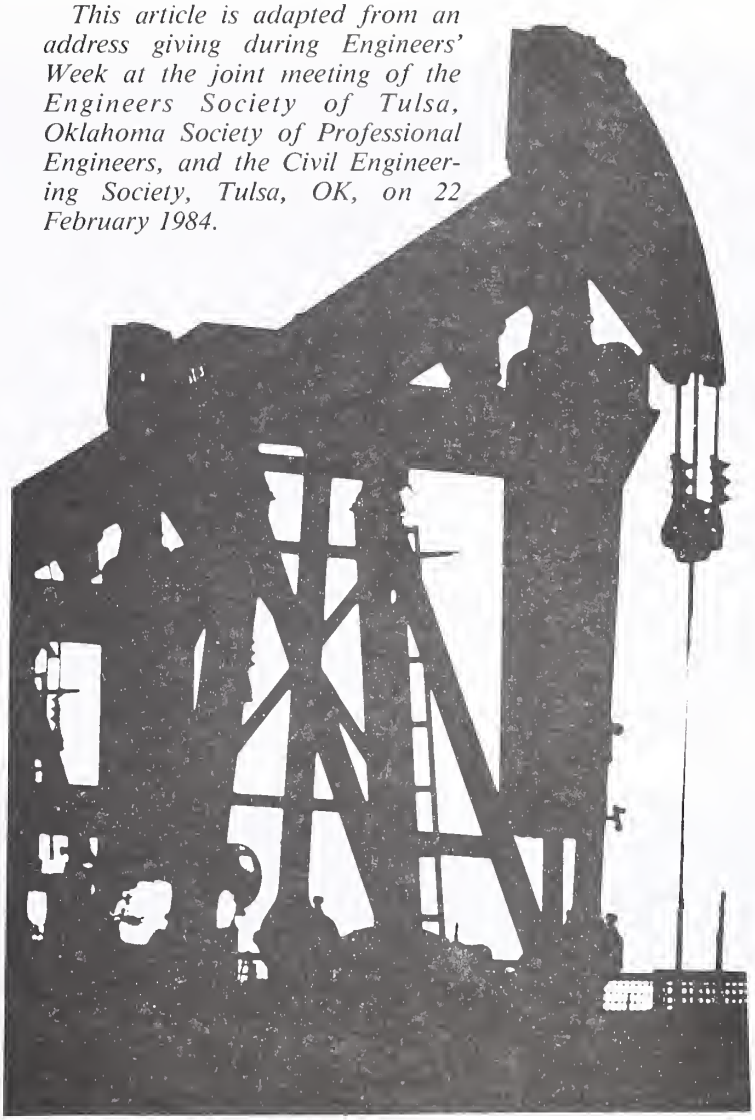
"In a situation where oil was in growing demand as a source of kerosene for lamps, Drake was in a position to dictate terms. The Bissell-Drake venture was quickly fending off would-be purchasers who rapidly bid up the price of crude oil to $20 a barrel."

ENHANCED OIL RECOVERY

PARTNERS IN PROGRESS

by Robert Folstein

This article is adapted from an address giving during Engineers' Week at the joint meeting of the Engineers Society of Tulsa, Oklahoma Society of Professional Engineers, and the Civil Engineering Society, Tulsa, OK, on 22 February 1984.



Most of you are familiar with the Bartlesville program in enhanced oil recovery (EOR) research and know of our dedication to this technology. [The Department of Energy (DOE) maintains the Bartlesville Project Office in Bartlesville, OK.] You are also keenly aware of the major commitments made by all of industry to produce the enormous U.S. resource of crude oil. The statistics are familiar. Of the 480 billion barrels of oil discovered to date, only 130 billion barrels have been produced. With reserves resulting from conventional production technology estimated at 29 billion barrels, this leaves an EOR target of more than 320 billion barrels. The estimates of the fraction that might be recoverable through EOR vary widely, covering a range from 9 billion to 52 billion barrels.

The National Petroleum Council is currently examining the potential of EOR. Their report should be released soon. It will be interesting to study their results and compare them with the first predictions and estimates they made in 1976.

There has been an enormous amount of activity in EOR since 1976, but not much production. We have been following this technology quite closely and have rather detailed data on more than 600 of the field projects that have been started during the past 8 years. Our most specific information is on the 26 cost-shared projects initiated under the Energy Research and Development Administration. We also have extensive data resulting from the 430 applications filed under the Tertiary Oil Recovery Incentive Program of a few years ago.

These field projects show an industry investment of several billion dollars. The biennial surveys in the *Oil and Gas Journal* confirm industry interest. Further demonstration of industry interest is shown by the large audiences at the biannual symposia jointly sponsored by the Society of Petroleum Engineers and DOE.

But despite all of this activity and interest, current EOR production is only about 400,000 barrels per day. Of this total, thermal recovery processes in giant California reservoirs account for 80 percent, up from 70 percent in 1976. Essentially all of the remaining EOR production comes from gas miscible flooding in west Texas.

I want to dwell on this for a minute and drive home just how limited EOR success has been. In regard to thermal EOR production, 97 percent comes from five counties in California. Kern County alone accounts for 77 percent of the total U.S. thermal production. These are ideal thermal EOR candidates, *"In spite of these compelling arguments, there are formidable technical constraints to a significant expansion of EOR production. The fact is that the residual oil target is simply not the same as the oil produced by conventional means; it exists in the reservoir, trapped by a variety of physical and chemical mechanisms."*

characterized by high oil saturations in very thick reservoirs with high porosity and permeability.

Furthermore 88 percent of all gas EOR production comes from only four reservoirs in five counties in Texas. These are ideal gas EOR candidates with thick pay zones having high oil saturation and high pressure. They are relatively homogeneous.

Thus uniquely favorable geology accounts for essentially all current EOR production. But the vast bulk of the resource lies in much less favorable settings with lower saturations, thinner pay zones, at greater depths and with greater heterogeneity. . .

We must develop advanced EOR technology promptly for several reasons:

- To maintain the level of lower 48 production and the economies of those states heavily dependent on oil income.
- To assure the Nation of the least cost increment of liquid fuel. Any other source will cost more.
- To maintain a viable domestic industry and decrease reliance on foreign supplies. Failure to develop advanced EOR will place greater pressures on the economy and, almost certainly, bring on more costly sources earlier than optimum economics would indicate.

In spite of these compelling arguments, there are formidable technical constraints to a significant expansion of EOR production. The fact is that the residual oil target is simply not the same as the oil produced by conventional means; it exists in the reservoir, trapped by a variety of physical and chemical mechanisms. Our understanding of these forces and the steps that might be taken to overcome them is limited, and we should not expect to see a significant increase in production until we can reliably predict the result of any proposed stimulation technique.

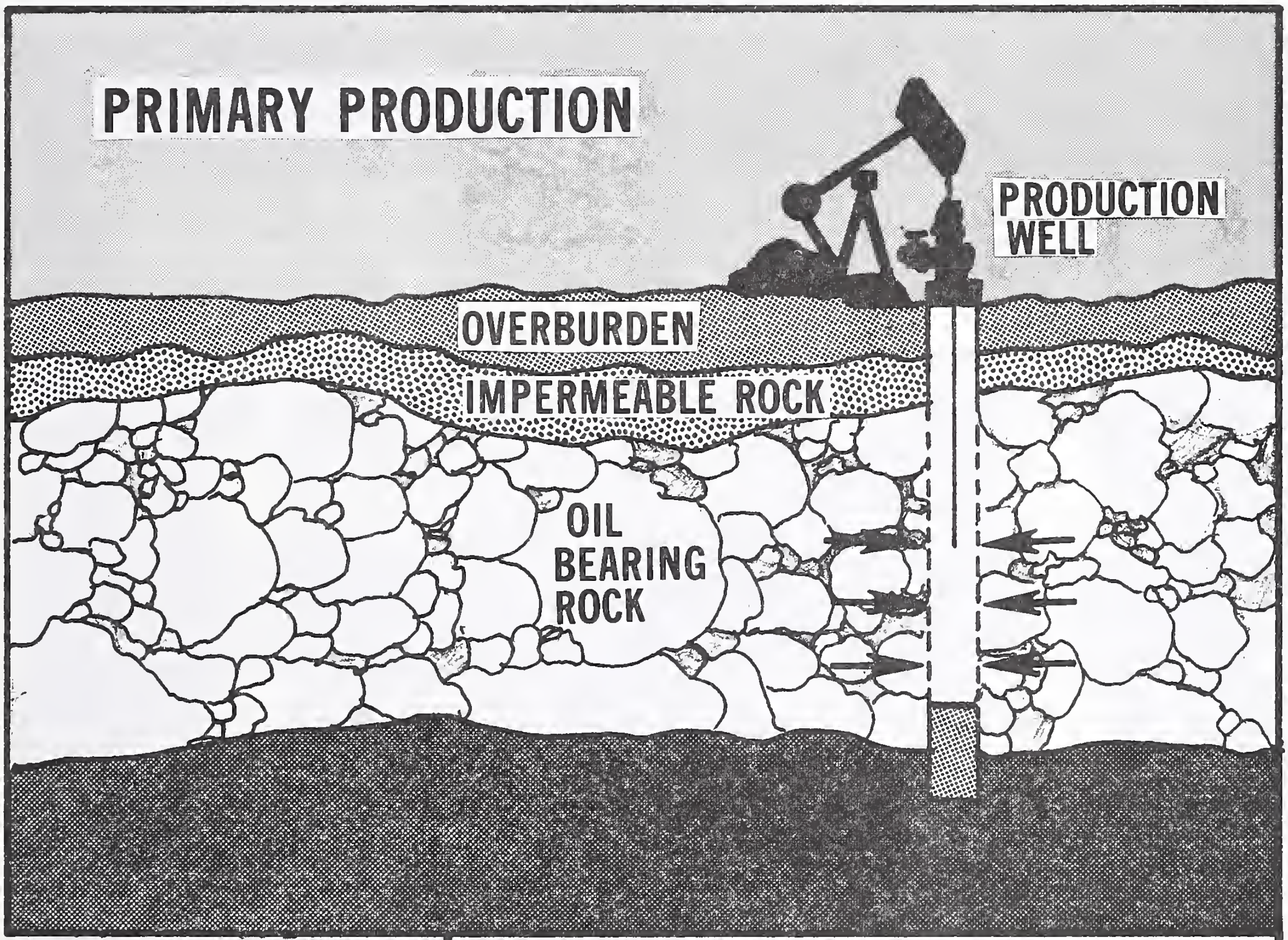
We believe that these engineering constraints are far more significant than the economic ones. It will take our combined efforts, in the field as well as in the laboratory, to overcome our current limitations. More efficient use of our domestic resources will bring great benefits to our Nation and to the economies of the individual producing States. FL

Robert Folstein is director of the Bartlesville Project Office, U.S. Department of Energy, Bartlesville, OK.

WHAT IS ENHANCED OIL RECOVERY?

Crude oil is not found in large underground lakes or pools. Rather, a petroleum reservoir consists of a porous rock formation within which tiny droplets of oil are trapped, frequently in association with water or natural gas. When a well is drilled into such a formation, natural pressures within the reservoir are often strong enough to send the oil and gas up the well bore to the surface, at least for a short time. Relying on natural pressures is called primary recovery. Later, various pumping systems may be used to keep the petroleum flowing. These conventional methods recover, on the average, about one-third of the oil in the reservoir.

Without enhanced recovery, the rest would be left in the ground. The National Petroleum Council (NPC), an advisory committee to the Department of Energy, estimates that from the beginning of the domestic petroleum industry in 1859 to 1982, drillers discovered 481 billion barrels of oil in the United States. Some 130 billion of those barrels were produced through 1982, with an additional 28 billion



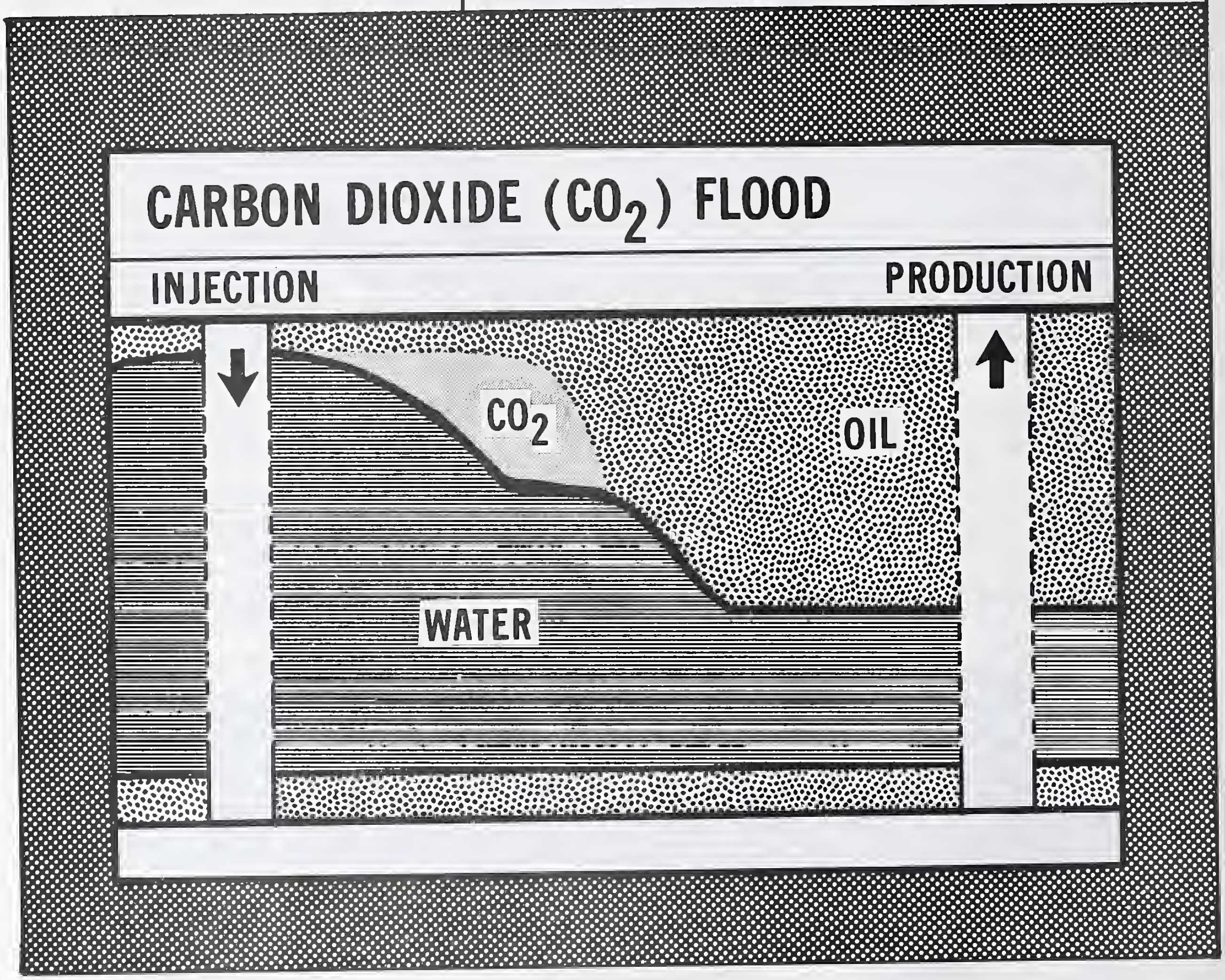
During primary production, up to 20 percent of the oil from light oil reservoirs will flow to the well under natural pressure. The recovery and production rates depend on such factors as permeability and depth of the reservoir, the properties of the oil, and distribution of gas and water within the reservoir.

barrels of proven oil reserves believed to be producible in time under current technological and economic conditions. With improved methods, much of the remaining 323 billion barrels of oil may be recoverable to meet America's future energy needs.

A recent NPC study estimated that in the next 30 years, currently producing fields in the United States will produce about 28 billion barrels of oil of which about 3.5 billion barrels will be produced through current recovery projects. Assuming a constant crude oil price of $30 a barrel (in 1983 dollars) throughout the next 30 years, and a minimum discounted cash flow rate of 10 percent, the study estimated that some 11 billion barrels could be added to the domestic crude oil supply by applying existing enhanced recovery methods to currently producing fields.

The feasibility of enhanced recovery methods depends on the cost of the equipment and supplies required, the market price of oil, and other economic factors, including tax policies. Obviously no

Carbon dioxide (CO_2) flood injection occurs at left: various slugs and buffers force oil through rock pores toward producers at right. With CO_2 flood, alternate slugs of water and gas are injected. Some mixing of CO_2 and oil occurs depending on temperature of oil and pressure used with mixing. Displacement efficiencies are notably improved.



one can afford to produce the oil if costs exceed what can be earned from selling the oil.

U.S. oil companies are investing billions of dollars in research and application of enhanced recovery techniques. The domestic petroleum industry will spend an estimated $38 billion on enhanced recovery during the 1980s. Currently there are close to 400 such projects in the United States, accounting for an estimated 5 to 6 percent of total U.S. crude oil production.

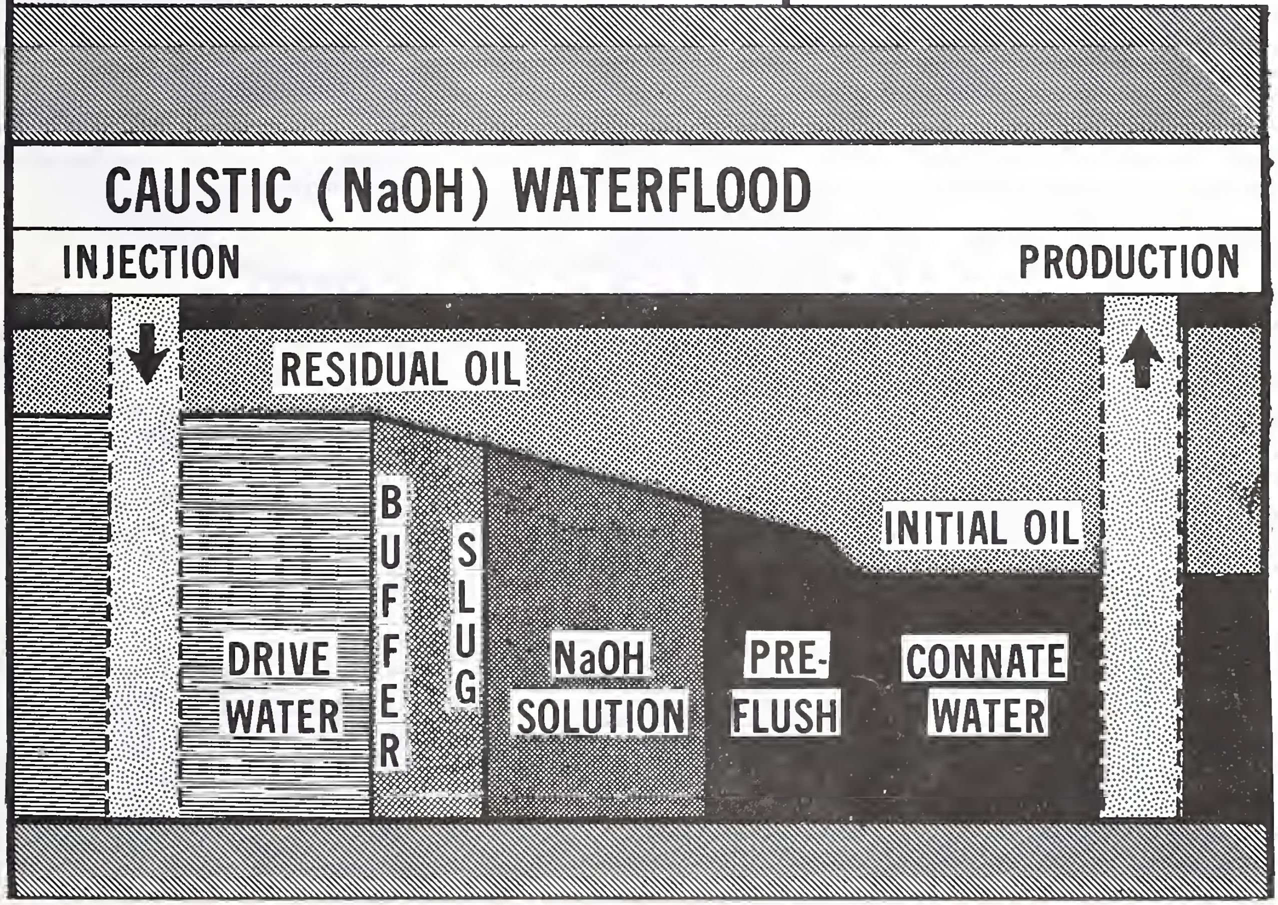
A recent survey by the *Oil and Gas Journal* counted 373 enhanced recovery projects in the United States, with a total productive capacity of 461,000 barrels a day, plus 73 other projects scheduled to begin operating before 1984 ends. The projects are in 19 States with a few programs also located in offshore fields in the Gulf of Mexico and off the coast of California.

Many new enhanced recovery techniques are being tested and studied across the Nation. The methods generally recognized as the most promising use either chemicals, heat, or fluids, including natural gas, propane, liquid hydrocarbons, carbon dioxide, or nitrogen. Other techniques are still in the experimental or developmental stages. Because petroleum reservoirs vary widely in their characteristics, a method that appears feasible in laboratory tests could be appropriate for one field and unsuccessful in another. Steam injection accounts for more than three-fourths of the enhanced oil recovery production in this country. The largest such project produces 95,000 barrels of oil a day from California's Kern River Field.

One of the fastest-growing recovery methods involves the injection of carbon dioxide under pressure to move trapped oil toward production wells. Most of the carbon dioxide comes from naturally occurring underground sources in Colorado and New Mexico. Oil companies have invested more than $1.5 billion to build two pipelines to carry carbon dioxide from the Rocky Mountain area to declining fields in western Texas. Plans have been announced to build a $250 million carbon dioxide pipeline from central Mississippi to fields in the southern part of the state.

Waterflooding and other improved recovery projects now underway or planned on Alaska's North Slope will require an additional investment of $3 billion. In addition to the 9.6 billion barrels originally estimated to be economically recoverable, there may be another 11 billion barrels, some of which can be produced through improved recovery methods. FL

Caustic (NaOH) waterflood injections occur at left and various slugs and buffers force oil through rock pores toward producers at right.



EIA SAYS NEW FINDS NEEDED TO MAINTAIN U.S. OIL PRODUCTION

Large new domestic oil discoveries will be required to replace declining production from old fields if current oil production in the United States is to be maintained. The Federal Offshore, Alaska North Slope, and other relatively unexplored areas offer the greatest potential for yielding these important new oil fields.

The Energy Information Administration (EIA) reaches these conclusions in a new study. EIA's report, *Impact of Surveillance Fields on Crude Oil Production in the United States,* focuses on declining production from 1,606 old, large oil fields that accounted for about 75 percent of U.S. production in 1982. Old fields are defined by EIA as those that produced oil before 1974. The EIA study covers trends from 1974 to 1982.

About 11 percent of U.S. oil production in 1982 came from the 6,315 new fields that began producing after 1973. Most of these fields were quite small. The report says that small fields will probably continue to be found in the mature producing areas of the United States.

However the EIA report concludes that domestic crude oil production will decline unless major new discoveries and significant advances in oil recovery techniques are added. The Federal Offshore, the Alaska North Slope, and other relatively unexplored areas offer the best potential for the major oil discoveries needed by the United States, according to the study.

Total U.S. production has varied less than 1 percent since the end of 1979 and is currently increasing slightly. Oil fields in the Alaska North Slope and the Federal Offshore areas have produced the substantial increases in crude oil necessary to maintain this rate of production for the United States during the past few years.

Excluding the Alaska North Slope and Federal Offshore areas, U.S. oil production has continued to decline despite unusually high numbers of wells drilled during the years 1980-82.

During this time more wells were drilled than in any previous 3-year period. Nonetheless this oil production continued to decline, but at reduced annual decline rates: from 5.3 percent in 1979 to 1 percent in 1981; 1.8 percent in 1982; and 1.3 percent in 1983.

The old fields had a composite annual production-decline rate of about 3 percent for 1980-82. Accelerated in-fill well drilling reduced production-decline rates for the old fields. (This process doesn't generally add to reserves.) Production from the old fields is expected to continue declining. If the 1,606 old fields continue the 3.1 percent annual production-decline rate, 210 million barrels of replacement oil will be required from new fields in 1985; 518 million barrels in 1990; and 783 million barrels (2.1 million barrels per day) in 1995. These requirements will simply maintain U.S. production levels.

If production from these old fields reverts to the 6 percent annual decline rate prevalent in the late 1970s, about 389 million barrels of replacement oil will be required in 1985; 900 million barrels in 1990; and 1,278 million barrels (3.5 million barrels per day) in 1995.

This replacement oil will have to come from the newer fields and from future discoveries if domestic oil production is to be maintained at the 1982 level of 3,157 million barrels, according to EIA.

Copies of *Impact of Surveillance Fields on Crude Oil Production in the United States* are available from the U.S. Government Printing Office (GPO) for $5 per copy, GPO Order No. 061-003-00405-9, or through the National Energy Information Center, Room 1F-048, Forrestal Building, Washington, DC 20585, commercial telephone: (202) 252-8800. FL

NORTH SEA OUTPUT NEARS ITS PEAK

Petroleum Gazette, *Spring 1984.*

With North Sea crude output now near its peak, European oil production is expected to decline through the next century, according to a study published in July 1984 by Data Resources, Inc.

The report notes that "even the stagnant demand level expected by then would require increasing oil imports." Europe's net oil imports are forecast to rise from 342 million tons of oil equivalent (TOE) in 1983 to 356 million and 418 million TOE in 1990 and 2005, respectively.

Imports of oil and gas would also increase, but oil would still dominate the energy trade picture, representing some 60 percent of total net imports of energy in 2005, compared to 80 percent today. In the long run, oil prices in real terms would resume an upward trend, even by the year 2000, although remaining below the 1982 level.

In current U.S. dollar terms, the average export weighted price of crude is expected to increase from an estimated $30.60 a barrel in 1984 to $44.10 in 1990 and $115 by 2000, the report estimates.

While the European economy is expected to see a considerable reduction in its total primary energy demand and delivered energy intensities, the bulk of the cutback is expected to be borne by oil.

The accelerating improvement in the overall efficiency of primary energy used in Europe over the next 20 years would be reflected in a 20 percent reduction in the primary energy intensity of its gross domestic product between 1983 and 2005. However the reduction in oil consumption would be considerably higher at 40 percent.

Although demand is projected to pick up this year, the long term increase will be modest at about 20 percent below the 1979 peak level, according to the estimates.

Given the stagnant trend for total oil demand, the share of oil in total primary energy demand will slip from 46 percent in 1983 to 37 percent in 2005.

The study points out that oil will nevertheless remain the dominant fuel with a share of some 15 percent above coal.

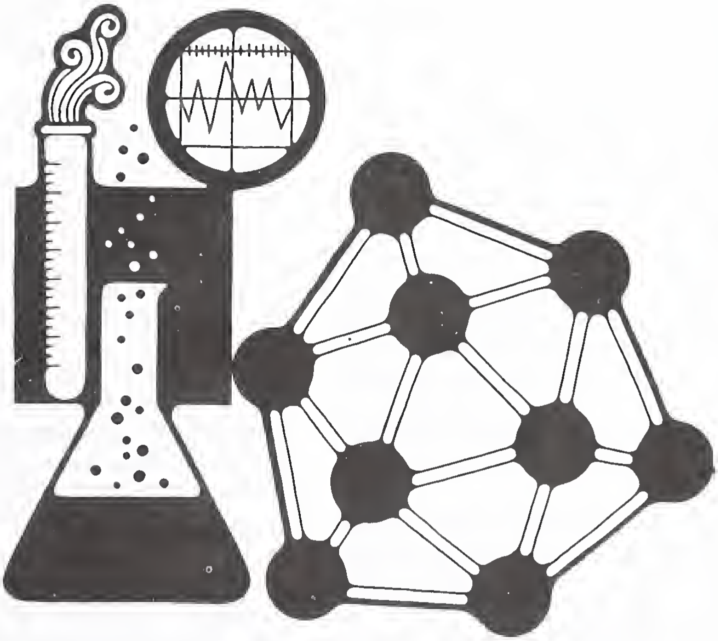
Total nuclear energy consumption is expected to more than double between 1983 and 2005 to reach 17 percent, overtaking that of natural gas in the late 1990s. FL

ENERGY DEPARTMENT SEEKS EOR INNOVATIONS

The Department of Energy wants to break down technological barriers to enhanced oil recovery (EOR) by using innovative ideas from the Nation's researchers. The Department solicited proposals for novel EOR projects in September and may award as much as $250,000 in grants to cover as many as 20 projects.

Ideas from three categories will be considered: geoscience, chemical flooding, and unusual extraction methods, including innovations in coal mining.

Many EOR studies already cosponsored by the Department will end in fiscal year 1985. FL



EIA PROJECTS RECORD 1984 COAL PRODUCTION AND CONSUMPTION

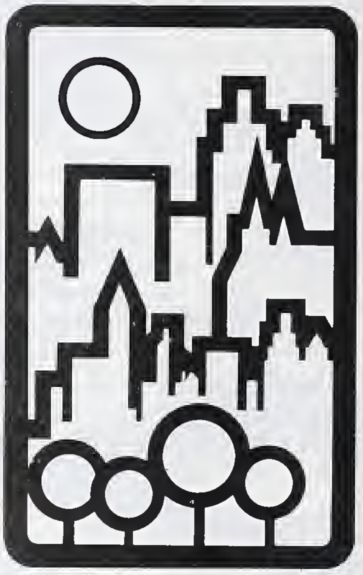
U.S. coal production and consumption may have reached record high levels in 1984, according to the Energy Information Administration (EIA).

EIA projects 1984 production to reach 892 million tons, up 14 percent from 1983 levels, and consumption to reach 793 million tons, up 8 percent from 1983. However coal production is expected to increase only by about 1 percent between 1984 and 1985, as stock levels are reduced over this time period; coal consumption should increase by about 6 percent between 1984 and 1985.

The increases in coal production, attributed to the increase in the demand for coal (principally from electronic utilities) and the possibility of a United Mine Workers (UMW) strike, led some coal consumers to build stocks of coal. Because the UMW strike did not occur, consumers are expected to reduce stocks during the last quarter of 1984 and throughout 1985, leading to a relatively small increase in production between 1984 and 1985.

EIA Administrator J. Erich Evered said these and other projections—included in EIA's quarterly *Short-Term Energy Outlook*—extended through 1985, thereby allowing comparisons between 1984 and 1985. Evered said the demand for most energy sources in 1984 is expected to be up appreciably from 1983 levels, due to rapid economic growth. Energy demand in 1985, however, is expected to grow at lower rates due to slower economic growth and continued energy conservation.

EIA's conclusions assume that the real gross national product (GNP) rises by 7 percent from 1983 to 1984, by 2.7 percent between 1984 and 1985, and that the average price of imported crude oil to the U.S. remains at $29 per barrel.



Highlights of EIA's *Short-Term Energy Outlook* indicate:

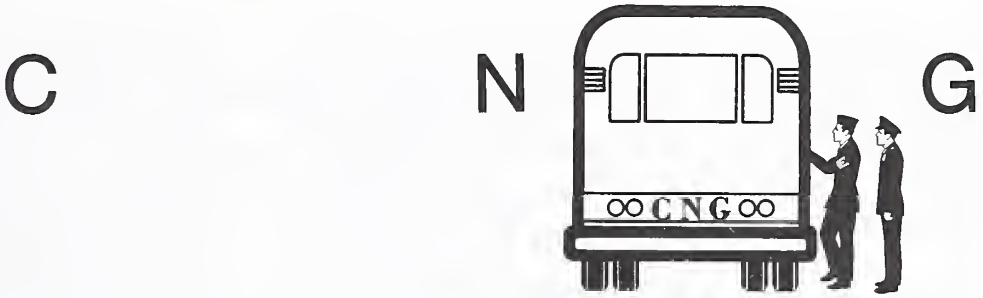
- Total U.S. petroleum consumption in 1984 is expected to rise by about 4 percent above year-earlier levels. Petroleum use in 1985 will decline slightly below the 1984 level.
- Net oil imports are projected to rise 10 percent in 1984 to nearly 4.8 million barrels per day. However only a small increase in the net imports level is expected in 1985.
- EIA expects natural gas consumption to rise to 18 trillion cubic feet in 1984 and to 18.2 trillion cubic feet in 1985.
- Domestic coal consumption is expected to increase to 793 million tons in 1984. All categories of coal consumption are expected to increase, leading to a record-high coal production of 892 million tons, 14 percent higher than the year-earlier level. Coal consumption in 1985 is forecast to increase by over 6 percent from the 1984 level; coal production is projected to grow much less rapidly in 1985 as demand for stockpiles and exports of coal are reduced.
- Total U.S. energy consumption is expected to rise almost 6 percent to 74.7 quadrillion British thermal units (Btu) in 1984, and to increase by over 1 percent between 1984 and 1985.
- The energy intensity of U.S. economic activity is projected to decline to 45.5 thousand Btu per 1972 dollar of GNP in 1984. With U.S. energy use projected to rise less rapidly than GNP from 1984 to 1985, a further slight decline in the energy/GNP ratio is expected, to 44.9 thousand Btu per 1972 dollar of GNP.

Copies of the *Short-Term Energy Outlook, Quarterly Projections, October 1984,* are available from the U.S. Government Printing Office, for $5 per copy and $24 for an annual subscription, or through EIA's National Energy Information Center, Room 1F-048, Forrestal Building, Washington, D.C. 20585, commercial telephone: (202) 252-8800. FL

USE COMPRESSED GAS IN CARS, FIRMS URGE

by Warren Brown

The Washington Post, *7 September 1984, used with permission*



The people at Washington Gas Light Co. would like to put a car in every garage—a car fueled by compressed natural gas (CNG).

That's their long-term goal.

Right now they and their peers in the American Gas Association would settle for CNG-fueled vehicles in every corporate and governmental fleet in America.

To make that point, Washington Gas Officials joined representatives of 27 other gas companies [in the District of Columbia on 6 September 1984] to launch a 5,000-mile "Rally for Fuel Savings," featuring six fleet-type vehicles equipped with CNG-powered engines.

The caravan included four vehicles—a Grumman van, a Chevrolet van, a Plymouth Reliant K passenger car, and a Toyota pickup truck—equipped to run on CNG or gasoline. Two other models, a Ford Ranger pickup truck and a Grumman van, ran on CNG only. A gasoline-powered Ranger truck was included for performance comparison with the CNG-powered Ford pickup.

The caravan was escorted by a 45-foot tractor-trailer carrying a reserve CNG supply. The rally had car-racing stars scheduled to do some of the driving—Bobby Unser and Johnny Rutherford—but it wasn't a race.

The rally ended in Los Angeles on 5 November. A vintage, four-cylinder gasoline-powered Ford Pinto subcompact traveling at 55 miles per hour, 8 hours daily, could finish the same 5,000-mile journey in less than 2 weeks.

The point was not to finish first. It was to make an impression, to hype an idea, gas association officials freely admitted. "It's an idea whose time has arrived," said Donald Heim, Washington Gas chairman and president. He said his company committed itself to making the idea reality 4 years ago, when it began converting its fleet to CNG use.

Today 145 Washington Gas vehicles, about 15 percent of the company's total fleet, are using CNG—giving the company an estimate annual fuel-cost saving of $163,000, Heim said.

The reason is that CNG is cheaper than gasoline. It costs about 45 cents to 80 cents per gallon-equivalent, compared with about $1.10 to $1.25 per gallon for gasoline, Heim and others said.

Washington Gas' fleet maintenance costs also have declined appreciably, mostly because CNG burns cleaner than gasoline, according to Washington Gas fleet mechanic Horace Hopkins.

Hopkins said CNG also is safer than gasoline, because CNG has a higher ignition point and is stored in aluminum cylinders that generally are better constructed than traditional gasoline tanks.

"We have no drawbacks with CNG that I can see, yet," Hopkins said. But there is at least one. "You wouldn't want to get an all-CNG car at this point, because there aren't that many stations to fuel it," Hopkins said. "Right now this is for fleets more than it is for families."

According to figures compiled by the McLean-based [VA] National Automobile Dealers Association, a total of 152 million vehicles were operating on U.S. roads as of 1 January 1984. About 25,000 to 30,000 of those vehicles were fueled with CNG, according to the gas association. An indefinite, but minuscule, number of other vehicles were running on alternate fuels such as methanol and liquid propane.

Converting some 8 million of the nation's fleet vehicles to CNG could save 650,000 barrels of oil per day—thus reducing the Nation's foreign energy payments by about $7 billion, gas association officials said. And conversion also would make lots of money for the Nation's natural gas industry, which has an abundance of natural gas to sell, the officials said.

Selling CNG year-round to fuel transportation also would help eliminate the highs and lows in the natural gas industry, which does well in the winter when traditional customers are heating their homes, but slumps in the summer when furnaces are turned off, American Gas Association officials said. FL

DFSC COAL PROGRAM IS A SMALL BUT LIVELY BUSINESS

by Linda Stacy-Nichols

Why does DFSC buy "pea, buckwheat, and chestnut" products for more than three dozen defense activities? These assorted "foods" are all types of anthracite coal. Along with the more common bituminous variety, they constitute a small but lively portion of the Center's ground fuels procurement.

Coal, once used extensively throughout the Department of Defense (DOD), has taken a backseat to petroleum fuels. Prior to 1946 (before the Air Force was formed), the Navy and Army purchased coal separately—5 million tons between them. In fiscal year 1984 DFSC procured only 1.65 million tons of the fossil fuel, enough to meet all the military coal requirements in the continental United States, Alaska, and Europe. A portion of this $87.12 million acquisition also fuels three prisons and eight other Federal Government facilities.

Despite declining coal use in the past four decades, requirements for the fuel have actually increased slightly since 1974. The oil embargo braked the rush to convert all Government activities to petroleum-based energy. In fact some facilities have reverted from other energy sources back to coal burning; many DFSC customers depend on coal to generate steam and hot water in central heat or power plants.

DFSC coal procurement is a nine-point program, divided into geographical regions. Under the direction of Frank Slevin, the five-person coal procurement staff negotiates contracts annually. About 30 days before the requirement is due for each area, DFSC contracting officers send letters to coal customers, seeking updated coal needs.

> *"Coal, once used extensively throughout the Department of Defense, has taken a backseat to petroleum fuels. Prior to 1946 (before the Air Force was formed), the Army and Navy purchased coal separately—5 million tons between them. In fiscal year 1984 DFSC procured only 1.65 million tons of the fossil fuel, enough to meet all the military requirements in the continental United States, Alaska, and Europe."*

Each customer's specifications are largely determined by the type of equipment in which the coal will be used. Chanute Air Force Base, IL, for example, has a boiler facility which has operated since the 1930s. The boiler can only burn coal of a 1½ by 1½-inch size. There are many other parameters the coal customer must consider prior to ordering. Customers are ultimately responsible for ensuring all coal emissions meet local Environmental Protection Agency standards and for ordering an efficient product. The user must strike a precarious balance between inadequate specification and overspecification which can unnecessarily inflate costs.

Coal is very different from the crude oils, which can be routinely refined to fairly exact fuel specifications. Coal can be washed to remove ash and other impurities that affect its quality, but it retains its basic properities after mining. There are also significant differences in coal, even that produced from the same mine. Consequently there are no Federal Government specifications for the fossil fuel. (The Commonwealth of Pennsylvania has established standards for the State's anthracite coal.) There are, however, guidelines and regulations customers may follow as they make their selections.

While DFSC customers are completing their coal purchase requests, the Center is busy at the acquisition end. Because coal is a uniquely individualistic fuel, DFSC purchases it not by its *apparent* lowest price, but based on its energy value. Before the procurement division will even consider a coal bid, the competing company must have had its product tested for physical and chemical properties at a Department of Energy laboratory. Contracting officers at DFSC use this data to determine the responsiveness of bids. Bids are evaluated based on the bidder's guaranteed quality. This is expressed as the number of British thermal units (Btus) of energy received for each penny spent. Other factors are also computed into the equation before an award is made, including free on board mine price, transportation costs, and physical variations within the coal which make it more or less desirable economically and environmentally.

Once contracts are awarded, the Directorate of Contracting and Production's Production Division administers them, but the DFSC customer continues to play a crucial part. The Btu content of an award bid is incorporated into the DFSC contract and sets the standard for that particular fuel. Each time a delivery is made, the coal may be tested. If the Btu figure is less than the contract standard, a debit is levied. Conversely, a credit is awarded if the coal has a higher energy potential. At the end of the contract period, the balance sheet is tallied to determine who pays and how much. It is the DFSC customer who must monitor these debits and credits locally.

Coal transportation is problematic because the fossil fuel is so bulky. Although liquid fuels can be efficiently supplied via pipeline, no coal slurry pipelines are available for DFSC use. Instead, truck and rail transport is the norm. Purchases are generally made as close to the user point as possible to keep costs down. Coal also has a tendency to freeze to its conveyance in cold weather, making unloading a laborious job. Freezeproofing is used to lessen this problem; oil treatment is employed to keep coal dust to a minimum as the product is transported.

The Defense Contract Adminstration Services (DCAS) completes the coal supply link with DFSC contracting officers, administrators, and customers. DCAS employees conduct pre-award surveys to weed out reliable contractors from non-reliable ones. Once awards are made, DCAS quality assurance representatives monitor shipments at the loading point by making visual inspections and verifying that coal is properly sampled and tested.

Even viewed peripherally, supplying coal to meet the needs of the DOD is complex work.

Navy Commander Don Swenson is well aware of the complexities of the job. He oversees coal contract administration in the DFSC Production Division and knows the number of people involved in each contract: coal buyers, administrators, military inventory representatives, accountants, heating plant operators, contractors, and quality inspectors.

"There are so many people involved," he said, "There are bound to be some rough edges. We are here to resolve any problems which cannot be corrected at the local level. From that perspective, it's very important to get people talking among themselves before a serious problem arises."

From Swenson's vantage, one of the best avenues to improved communication is the post award orientation conference, which provides a

"Each customer's specifications are largely determined by the type of equipment in which the coal will be used. Chanute Air Force Base, IL, for example, has a boiler facility which has operated since the 1930s. The boiler can only burn coal of a 1½ by 1½-inch size."

"Last year DFSC drew its fossil fuel acquisition into the computer age when employees developed a bid evaluation model for analyzing contractor responses for coal procurement. The model analyzed 11 contractors offering 6 grades of fuel for about 140 line items. The model, which processed the information in about 15 minutes of computer time, saved 40 days of manual effort."

chance for all who will be involved in the contract to discuss their rights and responsibilities. DFSC now conducts these conferences whenever a contractor has a history of performance problems, or is new to Government coal contracting. Post award conferences are also held with new DFSC customers to ease them into the intricacies of coal contracting.

"First we hold a Government representatives' conference," said Swenson, "Then we bring the contractor in. This is especially important because we don't usually deal with the actual coal mine owners, but with coal brokers. Everyone from coal samplers to coal users to the contractors are given the opportunity to discuss the contract. This has led to significant improvements in DFSC's role."

The Center is also improving its coal program in other areas. The Tri-Service Coal Workshop, conducted twice since its inception in 1982, has been invaluable at the management level. At the first workshop, 16 employees from DFSC and the Military Services gathered to discuss common problems and solutions. The participants also exchanged information about operations unique to each coal-using activity. The conference led to several improvements, including a simplified customer form for ordering coal.

The second coal workshop, held in 1984, basically followed the agenda of the first but also included technical briefings by industry. Members of the workshop are currently working on a target list of problems. Efforts are underway to improve coal sampling and to develop a means to certify DOD coal samplers.

In 1983 DFSC sponsored a quality assurance of coal class with the DCAS Management Area Dayton and the DCAS Region Cleveland. DCAS, Army, and Air Force representatives were students in the course, which concentrated on sampling and testing problems and included visits to local coal producers and testing facilities.

Last year DFSC drew its fossil fuel acquisition into the computer age when employees developed a bid evaluation model for analyzing contractor responses for coal procurement. The model analyzed 11 contractors offering 6 grades of fuel for about 140 line items. The model, which processed the information in about 15 minute of computer time, saved 40 days of manual effort.

Despite this significant modernization of the Center's coal program, DFSC, its customers, DCAS, and coal contractors must continue to share a complex interdependence in order to supply one of the earth's most ancient fuels to DOD and other Government activities. FL

"We have a unique opportunity today in the coal industry to do something that hasn't been possible for the last decade or so—to lay the technological foundation for a new generation of clean-burning, environmentally safe, economically efficient coal technologies. We no longer face the imminent threat of a nationally disabling oil cutoff, but the pressures once imposed by the Organization of Petroleum Exporting Countries' (OPEC) threat have been replaced by new pressures associated with environmental safety, typified by the controversy over acid rain. These challenges are equally as great, and equally as important. And I'm convinced that they, too, can be met by a solid, well-thought-out effort to develop new technologies."

William Vaughan, Assistant Secretary for Fossil Energy, before the Conference on Virginia Coal, Blacksburg, VA

COAL SUPPLY AND DISPOSITION

ANNUAL ENERGY REVIEW 1983, *Energy Information Administration.*

Production—Commercial quantities of coal are produced in 26 States from some 5,600 active mines; 15 percent of these mines provide about 80 percent of total coal output. The mines are controlled by approximately 3,500 companies, the majority of which are small. During recent years, the trend has been to develop larger mines and to consolidate operations for greater efficiency. In 1983 production totaled 785 million short tons, down 6.4 percent from the record high production of 838 million tons produced in 1982.

Productivity—Average output per man-day, which declined markedly during the early 1970s, began to increase near the end of that decade. By 1983 the average had risen to 18.0 short tons, from 14.3 short tons in 1976. Much of the increase reflected the growing importance of surface coal production, for which productivity is the highest.

Exports—Coal exports, which reached a record high of 113 million short tons in 1981, fell in 1982 and 1983, a reflection of reduced international industrial demand. Exports, which totaled 78 million short tons in 1983, were shipped principally to Japan, Canada, and Western Europe.

Consumption—Domestic consumption of coal during 1983 was 735 million short tons, 4 percent above the 1982 level. The leading consumer of coal continued to be electric utilities. In 1983 coal consumption by utilities rose to 626 million short tons. There is little seasonal variation in the use of coal. Decreases in the demand for coal after the heating season are generally offset by increases in the demand for coal by utilities to meet electric power requirements for air conditioning. There are, however, considerable variations in the supply of coal. Therefore large stockpiles are usually maintained at powerplants and coke plants to compensate for production losses due to strikes, bad weather, and other emergencies. For example, during the 1981 strike, which ended in June 1981, 50 million short tons of coal were drawn from inventories, approximately 30 percent of total stocks available. By yearend 1981, 24 million short tons of coal had been added to the depleted inventories. The especially high yearend 1982 stocks of 232 million short tons were drawn down by over 30 million short tons in 1983.

Resources—The U.S. Geological Survey (USGS) has identified U.S. coal resources of more than 1,700 billion short tons at depths of less than 3,000 feet. USGS also estimated the existence of additional coal resources of more than 2,200 billion short tons to depths of 6,000 feet. The Energy Information Administration estimated that approximately 483 billion short tons of coal were in the demonstrated reserve base (DRB) as of 1 January 1982. Although site-specific recovery rates range from 40 percent in some underground mines to more than 90 percent at some surface mines, it is estimated that on a national basis at least half of the coal in the DRB can be recovered.

International Production—World coal production rose from 3.7 billion short tons in 1975 to 4.4 billion short tons in 1982, an average growth rate of 2.6 percent per year. The United States, the Union of Soviet Socialist Republics (U.S.S.R.), and China together accounted for about 54 percent of the world's coal production during 1982.

International Reserves—In a 1982 report by the World Energy Conference, world recoverable coal reserves were estimated to be 987 billion short tons in 1980, 25 percent higher than in 1978. The United States, the U.S.S.R., China, Australia, and West Germany accounted for 81 percent of the world's estimated recoverable reserves of coal.

Prices—Domestic coal prices increased nominally in 1983, continuing a long term upward trend. The price of bituminous coal and lignite at the mine mouth averaged $28.00 per short ton and at electric utility powerplants, $35.50 per ton; the price of anthracite at preparation plants was up to $53.00 per ton. FL

REGION AND RESIDENCY NEWS

It was a busy year for all the Defense Fuel Regions. In this issue we feature some of the details that kept Caribbean and Middle Eastern personnel occupied throughout 1984. In the next FUEL LINE *we'll spotlight a couple of the regions closer to home.*

DEFENSE FUEL REGION CARIBBEAN

At the beginning of the year, the Defense Fuel Region Caribbean (DFR-CR) was still establishing support functions at Homestead Air Force Base, FL, where the Region moved from Roosevelt Roads, PR. Meanwhile tanker operations were in full swing; 31 liftings resulted in a total of 8.5 million barrels. Mexico crude oil lifts accounted for 5.2 million barrels of this total and required increased quality assurance manpower.

The October operation in Grenada really gave DFR-CR a chance to test emergency procedures. Personnel established quality control plans in Grenada and refined those already in effect in Trinidad to supply U.S. Forces during the crisis. The Region supported the new contractors by establishing resident field offices in Puerto Rico, Mexico, and St. Croix.

Mexican operations continued to receive a substantial amount of manpower during the second quarter of the year. Fourteen liftings accounted for 4.2 million barrels of fuel. Refined products from St. Croix, Aruba, Curaçao, and Puerto Rico accounted for 17 liftings and 3.2 million barrels. During this time, into-plane contract inspections were updated in several locations including Argentina, Chile, Uruguay, Paraguay, Brazil, Barbados, Antigua, Grenada, and St. Croix.

Four DFR-CR personnel were incapacitated or temporarily transferred during the third quarter of the year, resulting in many challenges for the Region's remaining employees. Fuel liftings remained constant with 32 liftings totaling 5.5 million barrels. (The situation was complicated by labor disputes at refineries.) In addition to the routine work, the Region supported an exercise in Puerto Rico and a tank truck delivery to the Air Force (the first ever for DFR-CR personnel).

When DFSC awarded new contracts toward the end of the year, Venezuela entered the market for the first time with a large award for aviation fuel. DFR-CR personnel made a preaward survey and developed a quality assurance program. The first successful lift was made within 30 days of the award. FL

DEFENSE FUEL REGION MIDDLE EAST

In October 1983 Defense Fuel Region Middle East (DFR-ME) was still a Quality Assurance Residency reporting to DFR Europe. There were 14 contracts in force at the beginning of the fiscal year and their total value was $229 million. Major quality assurance duties revolved around the Caltex contract in Bahrain (supplying motor gasoline, marine diesel fuel, and Navy special fuel oil) and a contract with Kuwait National Petroleum Corp. in Kuwait, which supplied jet fuel (JP-5) and marine diesel fuel. Quality surveillance responsibilities extended to monthly inspections for active terminals and quarterly inspections for inactive terminals.

The Residency was designated as a separate DFR reporting directly to the DFSC Commander on 1 April 1984. (The designation resulted from the Rapid Deployment Joint Task Force's establishment as a unified command on 1 January 1984.) The Region supports the U.S. Central Command, continues to monitor contracts, and is also now responsible for operations in Jordan, Egypt, and the Sudan.

The Iran-Iraq conflict escalated from a land war to indiscriminate sporadic bombings in the Arabian Gulf. As a result, USNS tankers withdrew from the Arabian Gulf in March. Because the U.S. Government was reluctant to send vessels in, Kuwait lifts were terminated in May. The contract remained dormant until August when ship-to-ship transfers began at Khor Fakkan, United Arab Emirates, near the straits of Hormuz. (As a stopgap from May until August, Defense Fuel Support Point (DFSP) Oman and Navy storage facilities at Diego Garcia supplied jet fuel (JP-5).)

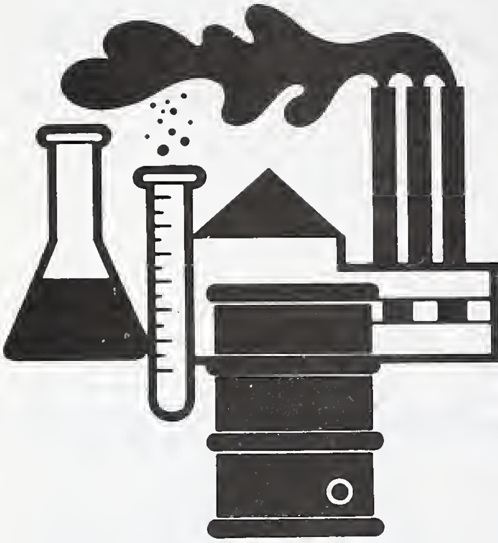
During the year, DFSC awarded Caltex a contract for 3 million barrels of jet fuel (JP-4) plus significant increases in marine diesel fuel and Navy special fuel oil. The award nearly tripled contract quantities and raised their value from $191 million to $367 million. The first lifts from these awards began in March and continued throughout the year. In August, because of the ship-to-ship transfer, quality assurance needs were doubled. Between the trebling of the Bahrain lifts and the doubling of resources needed for the Kuwait operation, DFR-ME experienced its busiest month since the end of the Vietnam conflict. Approximately 2.2 million barrels were moved in 13 lifts, compared to an average of 6 lifts and 550,000 barrels.

Improvements were made at three DFSPs in the Region. Shell Markets Middle East constructed a fuel system icing inhibitor injection system for the jet fuel (JP-5) tank. At DFSP Djibouti sumps were added to diesel fuel tanks to alleviate accumulated water bottoms. Water sumps were also installed at the diesel fuel tanks in Mombasa and an additional tank was added.

DFR-ME personnel assisted at a U.S. Navy terminal in Berbera, where three tanks were constructed in August. Although the Region has no responsibility for the terminal, it oversaw its first fuel discharge in September. FL

DEFENSE FUEL REGION EUROPE HOSTS QAR WORKSHOP

The Defense Fuel Region Europe hosted a Quality Assurance Workshop at Headquarters European Command, Patch Barracks, Stuttgart, Germany, on 10-11 October 1984. Conference participants addressed common problems, refined procedures and policies, and gained new information to improve performance quality.



FUEL LINE GLEANINGS

BIOTECHNOLOGY CONFERENCE SCHEDULED

The Oak Ridge National Laboratory/Department of Energy Symposium on "Biotechnology for Fuels and Chemicals," is scheduled for 14-17 May 1985 in Gatlinburg, TN. For further information contact Charles Scott, Chemical Technology Division, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37831. The commercial telephone number is: (615) 574-6775.

SHALE GAS CONTRACT AWARDED

The Department of Energy awarded a $4.7 million contract to BDM Corporation of McLean, VA, to study the potential for producing commercial quantities of shale gas in Pennsylvania, New York, Illinois, and Michigan. Organically rich shale deposits are expected at depths of 1,000 to 4,000 feet. The Morgantown Energy Technology Center will manage the project.

OIL DEMAND IN 1985

The Energy Information Administration (EIA) expects U.S. petroleum demand to increase in 1984 for the first time since 1978. The EIA predicts the demand will level off between 1984 and 1985.

EIA predicts the current economic expansion will increase U.S. petroleum use, which is expected to average 15.9 million barrels per day in 1984, more than 4 percent higher than the 1983 level. EIA projects almost no growth in petroleum demand between 1984 and 1985, however, because of a slowdown in the economy and continuing energy conservation.

These projections are outlined in EIA's quarterly *Short-Term Energy Outlook* which was published in August 1984. Copies are available from the EIA's National Energy Information Center, Room IF-048, Forrestal Building, Washington, DC 20585. The commercial telephone number is: (202) 252-8800.

NEW HULL COATING SAVES FUEL

A new system for coating ship hulls will save fuel and money. The Dok-Blok hull coating system, developed by the David Taylor Naval Ship Research and Development Center, uses a prefabricated multilayered sheet, about 3 by 6-feet, or large enough to overlap a single docking block. The material consists of two sheets of adhesive plastic which provide a way to coat ship hulls normally obstructed by docking blocks.

Formerly, docking blocks masked as much as 5 percent of the underwater portion of a destroyer's hull and up to 10 percent for a supertanker. Repositioning was the only way to coat the entire hull but it was often prohibitively expensive. Uncoated spots foul quickly and ships must use increased power and additional fuel to overcome the resulting drag.

The Naval Sea Systems Command studied the new system and concluded that an aircraft carrier undergoing periodic hull cleaning could save $340,000 a year in fuel costs, a destroyer could save $32,000, and a frigate $22,000. Estimated annual savings through the use of the Dok-Blok on all of the Navy's carriers, frigates, and destroyers could total more than $6 million. This represents a return of $9 for every dollar invested.

OIL ANALYSIS PROGRAM GROWS

In the past 2 years the Army oil analysis program in U.S. Army, Europe (USAREUR), has expanded and improved.

According to USAREUR's Deputy Chief of Staff for Logistics, 380 units submitted approximately 4,000 samples per month to 1 laboratory in 1982. Since then the number of participating units and servicing laboratories has tripled, and the number of samples submitted has tripled—and tripled again. Today 1,103 units submit approximately 36,000 samples per month to 3 laboratories. In addition, these 3 laboratories, out of 21 Army-wide, account for 36 percent of all nonaeronautical oil sample analyses performed throughout the Army.

In the past Army oil analysis was usually done on aeronautical equipment and selected tactical wheeled vehicles. The program now includes all combat vehicles; tactical wheeled vehicles; diesel electric locomotives; watercraft; and materials-handling, construction, and support equipment. Units and laboratories have reduced the administrative workload through better communication and oil sampling valves installed in equipment have made it easier to obtain good quality samples for analysis.

J-LOTS II HELD

The second joint logistics-over-the-shore exercise, J-LOTS II, held this fall at Fort Story, VA, evaluated the Services' abilities to establish and sustain resupply operations across undeveloped beaches. The exercise tested a portable causeway, causeway ferry, DeLong pier, commercial cargo ships, and military lighters. Also tested were an amphibious assault fuel supply facility, featuring boat-towable fuel bladders (the April-June 1984 *FUEL LINE* contains an article on this facility); a 210,000-gallon collapsible fuel storage tank; and the *SS Keystone State*, a converted ship carrying cranes used to unload containerships.

The 210,000-gallon collapsible fuel tank has recently been type classified and will soon fill a gap in the Army's large capacity fuel storage inventory. The largest collapsible tank currently in use has a 50,000-gallon capacity. The next larger fuel tank can hold 420,000 gallons, but it is made of bolted steel and requires considerable time and effort to install.

2D QUARTERMASTER GROUP ACTIVATED

The Petroleum Distribution System, Korea, a table of distribution and allowances unit, was converted in September to the 2d Quartermaster Group (Petroleum), a modified table of organization and equipment unit. It becomes the only active petroleum group in the Army. The 2d Quartermaster Group operates the 282-mile long, high-pressure pipeline in the Republic of Korea.

STUDENTS TRAINED ON REFUELING RECEPTACLES

C-5 aerial refueling receptacle models will be sent to Dover Air Force Base (AFB), DE, and Travis AFB, CA, next year. Instructors will use the refueling devices to simulate many maintenance problems; C-5s will be free for aircraft missions. Under the new system, students will spend only about 10 percent of their time working on actual C-5 aircraft.

DASC PROCUREMENT BRANCH TRANSFERRED TO DFSC

Under an Agency-wide move to consolidate all installation services procurement functions, DFSC is absorbing the Defense Logistics Agency Administrative Support Center's (DASC) Procurement Branch (DASC-WS). On 18 November 1984 personnel were detailed to begin the transfer which is slated for completion by March 1985. The DASC function will be moved to the Ground Fuels Division of the Directorate of Contracting and Production under the supervision of the division chief and the assistant chief (Tom Calhoun and Captain Frank Krempa, USAF). DASC-WS currently has a staff of four employees who are responsible for a range of procurements, including basic office supplies. The employees will be relocated to Building 8 at Cameron Station as soon as computer connections and office space become available.

AFB WASTE OIL FUELS MONUMENT

The National Park Service commended base officials at Hill Air Force Base, UT, for keeping the Park Service's only two operating locomotives on track. When the base discovered it cost more to recycle waste oil than it was worth, the oil was given to the National Park Service. In the last 4 years more than 90,000 gallons of waste oil have fueled the *Jupiter* and *No. 119* at the Golden Spike historic site near Promontory, UT. The first transcontinental railroad was formed at Golden Spike in 1869.

EIA PETROLEUM DATA AVAILABLE ON MAGNETIC TAPES

Petroleum supply statistics are now available on two magnetic tapes from the Energy Information Administration.

One tape contains final 1983 statistics by month, taken from the *Petroleum Supply Annual*; the other details 1984 monthly statistics from the *Petroleum Supply Monthly*. The first monthly tape release covers January through June 1984 and will be updated each month. Both tapes include full documentation.

Tapes can be ordered for $140 each from the National Technical Information Service, Office of Data Base Services, 5284 Port Royal Road, Springfield, VA 22161. Reference the appropriate National Technical Information Service number when you order: PB84-133022 identifies the *1983 Petroleum Supply Annual*; PB84-23441B is used for the 1984 cumulative edition of *Petroleum Supply Monthly*.

The current tape is also available by subscription. For more information, call commercially: (703) 487-4807.

ADVICE FOR "CONTINUOUS WORKERS"

Scientists at the Naval Health Research Center have some advice for firefighters, doctors and nurses, police, and industrial personnel who work on call: don't nap between the hours of 0300-0700. These 4 hours span the circadian low point of the day and employees who take 3-hour naps during this time are not adequately rested. The Center suggests that employees take longer naps or sleep during other periods of the day to restore high quality performance.

EIA PROFILES 26 ENERGY COMPANIES

The Energy Information Administration has released financial information on 26 major energy companies. *Performance Profiles of Major Energy Producers, 1982*, details income, investment, production, and related financial information about the companies. Copies of the booklet are available through the Government Printing Office (stock number: 061-003-00392-3), or at the National Energy Information Center, Room IF-048, Forrestal Building, Washington, DC 20580. The price is $7.

SPR SUPPORT CONTRACT AWARDED

Systematic Management Services, Inc., will handle management and technical support services for the Strategic Petroleum Reserve under a new 5-year contract. The contract was awarded in conjunction with Small Business Administration guidelines. The firm will assist in management at storage sites in Bryan Mound and Big Hill, TX, and West Hackberry, Sulphur Mines, Weeks Island, and Bayou Choctaw, LA.

ENGINEERS DISCOVER SOURCE OF FUEL TANK LEAKS

Sacramento Air Logistics Center engineers at McClellan Air Force Base, CA, have discovered why F-111 fuel tanks leak. Engineers found that the aircraft, which are flown by the Tactical Air Command, the Strategic Air Command, and the U.S. Air Forces in Europe, are leaking because the fuel tank sealant is reverting to its original liquid form. Repairs are being made as the aircraft go through regular depot maintenance.

MORE SMART IDEAS SHARED

The Army's Supply and Maintenance Assessment and Review Team (SMART) has distributed two additional messages which relate to the petroleum field.

The latest messages are:

- Message 40, which provides information on effective ways to record information when gauging petroleum storage tanks.
- Message 41, which eliminates the requirement to warm ground equipment before taking oil samples regardless of air temperature if the equipment has been operated within 30 days of the sampling.

DFSC OFFICE REASSIGNED

On 1 December 1984 the DFSC Safety and Health Office was moved from the Directorate of Facilities Management and assigned to the Office of Personal Staff. The safety and health officer is the principal advisor to the DFSC Commander for safety and health issues, including the Defense Logistics Agency occupational health and safety program. This program is in force at all DFSC elements, including government owned, contractor operated terminals.

SPR UPDATE

Strategic Petroleum Reserve caverns, pipelines, and holding tanks contained approximately 442,329,000 barrels of crude oil at the end of November 1984. Only two storage areas received oil during the month: Bryan Mound, TX, received 1.7 million barrels and West Hackberry, LA, received 4.2 million barrels. Crude oil stored at these two facilities now totals 172 million barrels at Bryan Mound, and 119 million barrels at West Hackberry.

TANKER MAY BOOST FUEL CAPACITY

The Army plans to purchase an off-the-shelf, commercial 7,500-gallon petroleum tank trailer to increase bulk fuel line-haul productivity without increasing manpower. The new tanker will operate on improved roads from the initial point of entry into the theater, forward into the corps area. The 5,000-gallon tanker will continue to provide line-haul transport from the corps area into the division area.

COMMERCIAL JET FUEL REQUIRES ADDITIVES

Logisticians planning support for exercises or deployments in underdeveloped theaters of operations should be aware that aviation jet fuel, JP-4, may not be available. Commercial jet fuel may be available locally, but it can only be used as an alternative fuel for U.S. aircraft when additives are mixed into it.

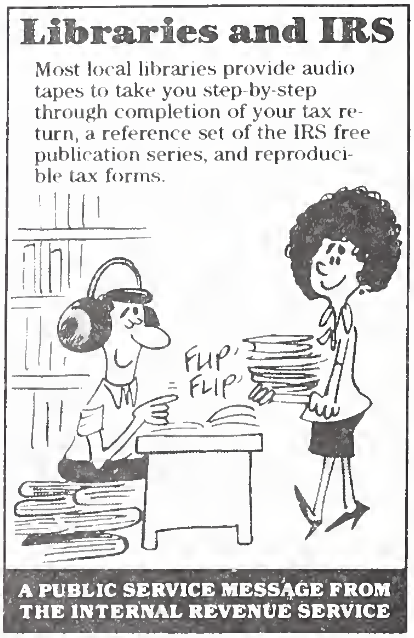
The required additives are fuel system icing inhibitor, antistatic dissipator, and corrosion inhibitor. These can be added manually in a procedure commonly known as “hand doping” the fuel. Instructions for blending the additives with commercial jet fuel may be found in Air Force Technical Order 42B-1-1 and in a message from the Army Mobility Equipment Research and Development (R&D) Command (now the Belvoir R&D Center), time-dated 081830Z September 1983.

Additional information can be obtained from the Army Energy Office by writing to: HQ DA, DALO-TSE, Washington, DC 20310, or calling autovon 225-9745.

Married Couples' Deduction

A two-earner couple who files a joint return may be able to deduct 10% of the qualified earned income of the lesser earning spouse. The maximum deduction is $3,000.

A PUBLIC SERVICE MESSAGE FROM THE INTERNAL REVENUE SERVICE



Libraries and IRS

Most local libraries provide audio tapes to take you step-by-step through completion of your tax return, a reference set of the IRS free publication series, and reproducible tax forms.

A PUBLIC SERVICE MESSAGE FROM THE INTERNAL REVENUE SERVICE

DOBERSON SELECTED AS ONE OF DLA'S TEN BEST

The Defense Logistics Agency selected DFSC employee Chester Doberson as one of ten outstanding employees of the year from a workforce of 49,000. Doberson is chief of the Traffic Management Branch in the Transportation Division of the Directorate of Supply Operations.

During 1984 Doberson directed 28 staff studies which led to a variety of improvements in the Center's supply operations. He helped establish new Defense Fuel Support Points (DFSP) and pipelines, including service for DFSP Point Molate, CA, which saved about $328,000 in transportation costs. Under Doberson's supervision, the staff studies also resulted in upgrading of DFSC rails, distribution of shale-derived jet fuel, and development of consumption statistics. Doberson negotiated with pipeline companies to add fuel filters and analyzed additive injection ratios.

Doberson was also cited for his work on the automated transportation program for which he developed a way to identify higher than average transportation costs and specific reasons for the increases. Defense Fuel Regions provide data for the program, which allows DFSC to plan for reduced transportation costs.

Under Doberson's guidance, the bulk fuels containerization program expanded to destinations in Roosevelt Roads, PR; Guantanamo Bay, Cuba; and the Mediterranean area. He oversaw policies which ensured the best use of containers, strict quality control, and measurement and proper documentation for transported quantities.

AIR FORCE SELECTS "BEST IN FUELS"

"Best in the Air Force" awards for the supply and fuels career fields were presented to 16 employees at a December ceremony in the Pentagon.

The 16 winners were selected from a workforce of about 50,000. The Air Staff chose the winners from 170 nominees from major commands and separate operating agencies. They were selected for outstanding duty performance, professional accomplishments, and improvements to their career fields.

Fuels award winners included: Captain Charles Park, fuels staff officer at Langley Air Force Base (AFB), VA; Captain William Fielder, base fuels officer, Andersen AFB, GU; Senior Master Sergeant Rickey Rice, fuels superintendent, Altus AFB, OK; Technical Sergeant Christopher Albert, fuels noncommissioned officer, Gunter Air Force Station, AL; Senior Airman Luis Blancarte III, fuels airman, Randolph AFB, TX; Master Sergeant David Ray, cryogenics noncommissioned officer, Kadena Air Base, Japan; and Barbara Prentiss, fuels civilian, Andrews AFB, MD.

YEAKLEY RECEIVES CONTRACTING AWARD

Shelby Yeakley, supervisory contracting officer of the Overseas Section of the Bulk Fuels Division, Directorate of Contracting and Production, received the DLA Contracting and Production Achievement Award on 3 December 1984 at the Agency's Contracting and Production Conference held in Williamsburg, VA. The award honored Yeakley for her contributions within the field of contracting.

DFSC TECHNICAL DIRECTORATE EMPLOYEES RECEIVE FWP AWARDS

Calvin Martin, director of Technical Operations, and Christine Metz, a chemist in the same Directorate, recently received Defense Logistics Agency Federal Women's Program awards.

Martin, a DFSC employee since 1973, was named as an outstanding supervisor under the Federal Women's Program. He was cited for several firsts in quality assurance assignments for women, including sending two women in the Directorate to oversee quality of crude oil liftings in Mexico for the Strategic Petroleum Reserve (SPR). Under Martin's leadership, a woman was promoted to senior chemist in the Directorate's Technical Services Division, and the first female quality assurance representative was hired at a DFSC field element. This duty at the Defense Fuel Quality Assurance Residency in Curaçao was described as a breakthrough for women at a previously male-only assignment.

Christine Metz, who was promoted this year to senior chemist, received an Outstanding Woman of the Year Award. She was recognized for a wide variety of achievements, including her skill in negotiating technical aspects of new and difficult DFSC contracts. These contracts included solicitations for floating storage, worldwide "buy in place" programs, and technical services. Metz was also one of the two women who performed quality assurance work in Mexico for SPR crude oil. In her current position, Metz oversees the Acquisition Support Section of the Technical Services Division. She began her career at DFSC 7 years ago.

DFSC BEGINS QSR TRAINING

DFSC recently completed the first phase of formal instruction for six quality surveillance representative (QSR) trainees. The training, which was conducted by the Directorate of Technical Operations, is part of the QSR Trainee Program. This program strives to provide well-qualified, motivated personnel for quality surveillance positions at bulk petroleum terminals. These individuals entered the program at the GS-5 or GS-7 level, depending on their individual qualifications. After successfully completing the program, participants will progress to the grade of GS-9.

Participants in the training included: front row, left to right: John Guzzardi*, Sergeant First Class John Wells, Theresa Wilson*, Willie Cotton*, and Otis Stowe*. Second row, left to right: Sterling Dorn (DFSC technical training coordinator), Larry Robinson, Donald Matthews, Edwin Ramirez*, William Evans*, and Major William Holcombe (DFSC quality assurance officer). Names marked with an asterisk indicate QSR trainees; others who attended the course are QSRs.

DOD CONTINUES FIGHT AGAINST FRAUD, WASTE, AND ABUSE

"I consider this type of activity on the same level as sabotage." So remarked U.S. District Court Judge Marvin Shoob in sentencing two employees of Metal Service Center of Georgia, Inc., to 10 years in prison and directing they be placed on probation for 5 years following their release.

The two had been convicted of selling inferior metal to the Department of Defense (DOD). Some of the metal found its way into armor plating for the battleship *USS New Jersey* and the space shuttle program. Judge Shoob also stated that one of the defendants "endangered the lives of a lot of people; motivated by greed and a lack of concern for his country."

Combating fraud, waste, and abuse is a continuing priority for the DOD. In the last 3 years, according to the Defense Department, significant progress has been made, saving taxpayers billions of dollars.

In the past 3 years:

- 59,000 internal audits were completed, with potential savings of $6.1 billion;
- 123,000 corrective actions were completed on 41,000 DOD internal audit reports, resulting in monetary benefits of $2.8 billion;
- 2,400 corrective actions were taken on 1,000 General Accounting Office (GAO) reports, resulting in monetary benefits of $3.6 billion; and
- An additional 4,000 DOD and GAO reports are being tracked, with potential savings of $3.1 billion.

In October 1981 Secretary of Defense Caspar Weinberger established the Defense Criminal Investigative Service (DCIS) to focus on "white collar" crime. The DCIS is a specialized unit under the DOD inspector general with about 250 agents in 10 main field offices and 18 subordinate locations.

DCIS has an impressive record: 186 indictments, 143 convictions, and $18 million in fines, recoveries, and recoupments. Included in these figures are judgments against these Defense contractors:

- *Sperry Corporation*—Convicted of mischarging labor hours on two Air Force contracts involving the Peacekeeper missile. A total of $30,000 in fines, $650,000 in double damages, and $167,000 in interest penalties was assessed.
- *Davey Compressor Company*—Convicted of fabricating documents to inflate the cost of materials. Davey's vice president was sentenced to 2 years in jail, and the company was fined $250,000 plus $2.7 million in civil penalties.
- *National Semiconductor*—Convicted of false certification of microchips. Criminal fines of $247,000, $105,000 for the cost of prosecution, and $1.4 million in civil penalties were levied.
- *Municipal and Industrial Pipe Services, Ltd.*—Convicted of submitting fraudulent statements concerning construction work at 14 DOD facilities. Sentences ranging from 6 months to 8 years were imposed on three corporate officers, all members of the same family. FL

HOW TO "TAKE A BRIBER"

A former Government procurement analyst learned the hard way that accepting bribes can lead to real trouble.

The analyst, a GS-12 with 12 years of Federal service, pleaded guilty to accepting approximately $1,000 in cash from the president of a Connecticut firm for disclosing confidential pricing information.

A U.S. District Court judge placed him on 5 years probation and fined him $2,000. The analyst resigned from Government service the day after he was indicted.

Bribery is just one of the subjects covered in a new Department of Defense (DOD) Inspector General Office publication, "Indicators of Fraud in DOD Procurement." Some 50,000 copies have been distributed since its late-summer publication.

Michael Eberhardt, Assistant Inspector General for Criminal Investigations, Policy, and Oversight, says the 56-page publication is an analysis of various types of fraud that have been seen in the Department of Defense.

"The book," he says, "is intended to sensitize Department of Defense procurement personnel to a variety of criminal, contractual, civil, and administrative abuses." The book also identifies a list of remedies that can be used to rectify these problems.

Eberhardt says people who are offered a bribe should handle the situation very carefully. "I've personally seen cases where an employee is offered a bribe and responds, 'No, and if you ever offer me a bribe again, I'll turn you in.' "

That person, says Eberhardt, made two errors. "He made a mistake by not reporting the bribe, and he made the mistake of turning the guy off." The correct way of handling an offer of a bribe, says Eberhardt, is to remain noncommittal. Tell the person you want to think about it and then report the incident to the DOD Fraud, Waste, and Abuse Hotline. FL

DEFENSE HOTLINE

FOR FRAUD, WASTE, ABUSE REPORTING

800/424-9098-toll free

223-5080-Autovon

693-5080-FTS

693-5080 Washington, D.C. Metro area.

OR WRITE:

DEFENSE HOTLINE
THE PENTAGON
WASHINGTON, D.C.
20301 · 1900

IDENTITIES OF WRITERS & CALLERS FULLY PROTECTED.

Dear Editor

EDITOR, *FUEL LINE:*

The energy crisis, as most people call it, began with the Arab oil embargo in 1973. In 1979 the Iranian Revolution resulted in another cutback in foreign crude oil and a further emphasized U.S. dependence on imported oil. Today, however, in the midst of a worldwide oil glut, many of us have forgotten the gas lines of the past and have boldly proclaimed America's energy independence. But the fact is that the United States will remain dependent on imported energy for a long time to come.

During the last 10 years the energy picture has changed dramatically. The United States has reduced its crude supply imports from 47 percent in 1979 to approximately 34 percent in July of this year. After the Iranian revolution, conservation was in full swing. Some economists thought Americans would pay any price for crude oil rather than cut consumption, but they were wrong! Conservation during the last few years has dampened the thirst for Organization of Petroleum Exporting Countries (OPEC) oil. By mid-1982 oil consumption in the United States had declined to levels less than before the oil embargoes. Americans have steadily reduced the amount of energy they use to accomplish their economic objectives. Industry is using less energy while the gross national product is continuing to grow.

But is the energy picture as bright as some Americans believe it to be? America has only temporarily reduced its dependence on imported energy. There is strong reason to believe the bright picture will soon blur. U.S. energy needs are projected to increase in the future, with little increase in domestic production. At the same time OPEC will account for 50 percent of the free world's oil production and 64 percent of the proven crude reserves. Proven reserves in the United States are estimated at about 10 years worth. Undoubtedly this reserve will grow with continued exploration, but there will be a time when our "barrel runs dry."

An oil company recently predicted that the main sources of energy through the year 2000 will continue to be oil, gas, and coal, with minimal use of alternate energy forms. The message is clear: America's continued dependence on imported crude oil is a subject that must be addressed now.

In the midst of this oil glut many Americans believe that we should not be filling the Strategic Petroleum Reserve (SPR), that the United States does not need a synthetic fuels industry, and that Federal Government lands should not be developed. These concerns raise serious questions about the future of U.S. energy independence.

I believe our country does need an SPR to buffer against a future oil cutoff. The recent Persian Gulf conflict portends how vulnerable the United States and its allies could be to crude oil embargoes. The United States does need an effective and efficient synthetic fuels industry which is supported by the Government. Such an industry would lessen our dependence on imports and provide a psychological barrier against OPEC. Finally, I believe the United States needs to develop Government lands to recover its natural resources. These lands contain a substantial amount of natural gas, oil, and coal and their development would greatly reduce our dependence on imported crude.

If this country is to successfully manage its energy crisis, Americans must have the foresight and fortitude to plan for the future. Presently we are enjoying the good years. We must take advantage of these good years, because the hard years may be right around the corner. FL

Captain William Gibson, USAF, has served as executive officer of the Aerospace Fuels Petroleum Supply Office (Detachment 29), Cameron Station, since 1983. He entered the petroleum career field in 1977. This letter contains Captain Gibson's personal opinions, which are not necessarily those of the Department of Defense.

The FUEL LINE *welcomes signed letters from readers. Please include your telephone number. We reserve the right to edit all correspondence to comply with U.S. Government style guidelines.*

IMPORTANT NOTICE TO FUEL LINE READERS

We are updating the mailing list for the *FUEL LINE.* If you receive your copy of the *FUEL LINE* through the mail and wish to continue receiving it, complete the information below. Ensure that your mailing label is affixed on the other side of this page (including corrections) and mail the entire page to: Defense Fuel Supply Center, ATTN: DFSC-AP (*FUEL LINE* Editor), Cameron Station, Alexandria, VA 22304-6160. (Organizations which receive multiple copies of the *FUEL LINE* should submit one copy of this renewal.)

Check one:
_______The address on my label is correct.
_______Correct the address as noted on the label.

Fill in number of copies:
Number of copies currently receiving: _______
Number of copies desired: _________

Additional comments: ____
____

DEFENSE FUEL SUPPLY CENTER

WINTER 1985

FUEL LINE *is an official publication, prepared quarterly by and for the Defense Fuel Supply Center and fuel-oriented clientele.* FUEL LINE *is designed to provide timely, factual information on policies, plans, operations, and technical developments of the Center and other interrelated subject matter. Views and opinions expressed in* FUEL LINE *are not necessarily those of the Department of Defense.*

*Submissions and inquiries should be addressed to: Defense Fuel Supply Center, ATTN: DFSC-AP (*FUEL LINE *Editor), Cameron Station, Alexandria, VA 22304-6160.*

Commercial telephone: (202) 274-6489, or autovon 284-6489.

Major photographic and graphic art services are provided by the Defense Logistics Agency Administrative Support Center, Technical Presentations Division.

Rear Admiral William Ryan, SC, USN
Commander
Defense Fuel Supply Center

Colonel Larry Bower, USAF
Deputy Commander

Donald Peters
Public Affairs Officer

Linda Stacy-Nichols
Editor

UNIVERSITY OF FLORIDA
3 1262 09683 6662

FLARE

CAMERON STATION

NOTICE: This issue contains renewal information for those on the FUEL LINE *mailing list.*

DFSC-AP

Defense Logistics Agency
Defense Fuel Supply Center
Cameron Station
Alexandria, VA 22304-6160

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

THIRD CLASS MAIL
POSTAGE & FEES PAID
DEFENSE LOGISTICS AGENCY
PERMIT No. G-53